COTTON

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Number Six
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APRIL, 1916

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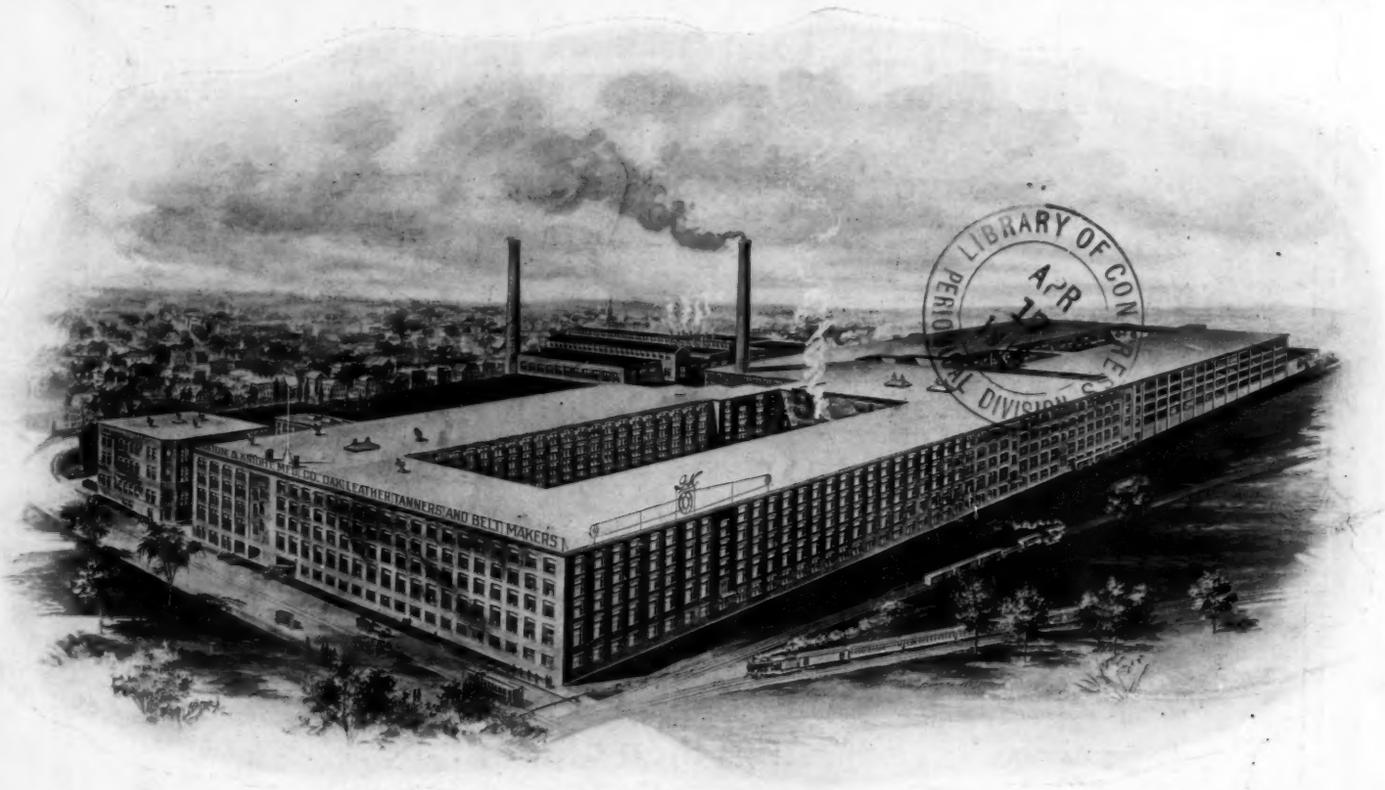

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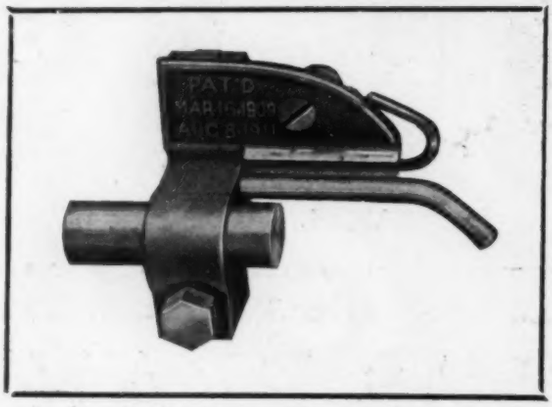

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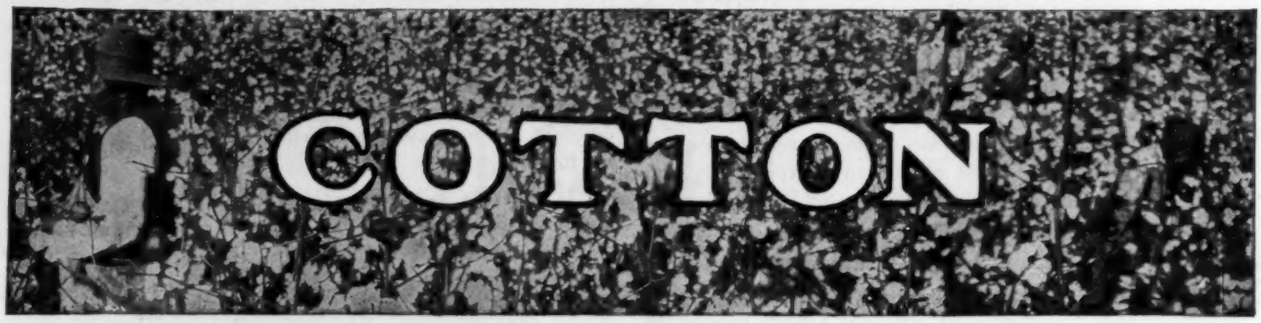


April, Nineteen Sixteen.

The Right to Work.

The so-called "right to work" law of Idaho has been declared void by the state supreme court. It gave any unemployed citizen of Idaho the right to employment at $1.50 a day by his county authorities for 60 days in each year. The law was open to considerable just criticism. It ignored sound economic principles and would sooner or later have broken down, had it been allowed to operate without amendment.

Nevertheless it had its good points. It accorded legal recognition to the right of every man to an opportunity to support himself, without placing himself under obligation to others. If recognition of that right is unconstitutional in Idaho, then it is high time that the constitution be changed.

However, the right to work does not mean the right to employment by public authorities. It is quite conceivable that the public authorities may have all the men at work whom they can employ at productive labor. To employ others at unproductive work, merely because they happen to be in need, would only be a form of wasteful charity.

The right to work means the right of access to natural opportunities. It means that all men should have equal right to use the ability they possess for earning a livelihood, so long as it be honest, regardless of their affiliation or non-affiliation with a labor organization.

It may be advisable for an employer to refuse employment to a member of a labor union because of possible strife which he may create in an otherwise satisfied organization. This is the employers privilege and is accorded to him because of the attitude frequently adopted by labor organizations tending to foment such strife. Nevertheless such a privilege is unjust.

In some sections of the country, and in certain trades, labor has become more fully organized, and instances are frequently seen where a workman of known ability is unable to secure work at his trade because he declines to submit to the autocratic rules of the labor leaders; in other words, he refuses to affiliate with the labor organizations. Such a condition is equally unjust.

Most employers will welcome some arrangement whereby a man seeking employment may be considered on the basis of ability—physical, mental and manual.

Such an arrangement can only come through suitable national laws increasing the financial responsibility of labor organizations, compelling the enforcement of labor contracts, and discountenancing the plea of ignorance on the part of the union or its members.

If the members of the national congress can be induced to place such a law upon the statute books it will be equally advantageous to employers and employees, and will remove the stigma of class legislation that was placed upon the country by the passage of recent laws, ostensibly in behalf of labor. All this is a large order and can only be accomplished by cooperative work between the employers and the employed. Whether they can get together is not within the province of COTTON to predict, but it would seem to be a subject well worthy of consideration by all.

Servants of Business.

While milestones mark progress made, steps make the progress. The use of the telephone in business has made rapid progress in recent years and each separate advance leaves its milestone behind, while progressing another step forward. A few years ago a telephone even in the business office, was the exception, now it is the rule. Moreover, many plants are using the intercommunicating telephone system to facilitate operations within the plant itself, saving much time and labor thereby.

Forty years ago Alexander Graham Bell and Elisha Gray, two American scientists, invented the telephone. Last year, on January 25th, the formal opening of the transcontinental line extending from Boston and New York on the Atlantic seaboard to San Francisco on the Pacific, took its place in the pages of history.

In the forty years since Bell made his discovery, the use of the telephone has grown so amazingly that the present Bell System at the end of nineteen fifteen connected more than nine million telephones, using over 18½ million miles of wire for this purpose, and registering a daily average, including long-distance calls, of over 26 million calls. This totals more than eight billion six hundred million telephone calls for nineteen fifteen. These figures do not include calls from connecting companies or any uncompleted connections.

Perhaps one of the most interesting advances in the art has been in the development of radio telephony during the past year. The engineering department of the Bell System, acting in cooperation with the Navy Department at Arlington, Va., established wireless telephone communication between Arlington, Va., and Pearl Harbor in the Hawaiian Islands, and also with the French military officers at the Eiffel Tower in Paris, the spoken words being heard distinctly. This feature of speech transmission is still in its infancy, but with the records of forty years of progress before us, who will predict what the future may bring forth.

A War-time Disease; Its Cause and Remedy.

A mill superintendent wired a Southern distributor for twenty barrels of a certain product to be delivered at a certain date two weeks hence, the delivery to be a part of the contract. The salesman was unable to accept the order because, owing to the freight congestion at New York, such a delivery was out of the question.

There is no mystery about the causes of this freight congestion. The same forces that have made New York the financial banking center of the country, have so increased its commercial development that a large proportion of the exports of the country pass therefrom. This growth in business has been gradual and facilities for its prompt handling have also grown to proportions sufficient for all normal conditions. The enormous increase in the business from this important port due to war orders, and the serious shortage of water transportation has, combined, so effectively clogged the usual avenues of trade as to make deliveries to points in the South from New England territory a rather uncertain problem.

The remedy for this condition which immediately suggests itself, is to carry a suitable supply for all immediate needs on storage in Southern centers. Adequate warehouse facilities are to be had in Atlanta, with low insurance and storage costs and ample transportation facilities. Similar conditions prevail in many other Southern cities. Therefore, there is really no excuse for slow deliveries on such materials as are sold from bulk or stock and not especially manufactured to fill each individual order. The plea that the amount of Southern business transacted does not warrant the maintenance of a Southern supply center is also inconclusive, as the volume of business is in the South for someone and those firms in a position to make prompt deliveries will and do secure the lion's share.

Southern Textile Exposition, Inc.

J. E. Sirrine, R. F. Bowe, and Milton G. Smith, all of Greenville, S. C., as the committee on organization of the Southern Textile Exposition, Inc., together with W. M. Sherard, Williamston, S. C., Frank E. Heymer, Alexander City, Ala., A. B. Carter, Greenville, S. C., Marshall Dilling, Siluria, Ala., and Robt. F. Bowe, Greenville, S. C., the present officers of the Southern Textile Association, as the incorporators, have issued the following prospectus for this new organization that grew out of the big southern machinery show last fall. It is reproduced for the benefit of those possible exhibitors not already familiar with the proposition.

SECTION A.

Owing to the success of the recent Textile Exposition which was held in Greenville in November, the Southern Textile Association at its last convention authorized the establishment of a permanent textile exposition to be held in Greenville biennially, or as often as the directors may appoint. Southern manufacturing interests supply the demand for a machinery exhibition in the South.

The committee immediately began work on the details of the plan. After careful investigation it was decided that as there was no suitable building in Greenville the committee would erect an exposition building, designing it so as to make it available for other displays and exhibitions. It can also be arranged for other uses so that a reasonable income may be had at all times when the building is not being used for expositions. The committee already is assured of several large exhibitions during 1916, and this alone will do much toward paying a substantial dividend on the capital invested.

A desirable location for the building can be provided, one within easy reach of the center of the city and having side-track facilities. The building to have not less than 60,000 square feet of space, and so constructed that it may be added to later. Suitable offices, entrances and exits, coat and smoking rooms, telegraph and express offices, storage space for crates, and other conveniences will be provided.

Section B, following, gives a condensed outline of the plan for the new organization. For the benefit of those who were not at the last exposition it may be of interest to know its development. The membership of the Southern Textile Association is about 1,600, and is composed of cotton mill superintendents, overseers, master mechanics, chief electricians and representatives of mill machinery and supply companies. The first Southern Textile Exposition was held in Greenville, S. C., November 2nd to 6th, 1915, under the auspices of the Association; its management was in charge of an Executive Committee appointed by the Association. The success of this Exposition is history and practically every exhibitor and member of the Association has pledged his support for the permanent Exposition.

SECTION B.

The name of the company is "Southern Textile Exposition, Incorporated." It is being incorporated under the laws of South Carolina with its principal office at Greenville.

The capital stock will be $75,000 divided into 1,500 shares of par value of $50.00 each. Each share will be entitled to one vote. This stock is offered first to exhibitors and members of the Southern Textile Association at par. A subscription blank is herewith enclosed. Those desiring to subscribe for stock are asked to sign the same and return it as soon as possible. Subscriptions for stock will be payable 20 per cent on April 1, 1916, and 20 per cent every two months thereafter until paid in full. All of the authorized stock not subscribed for by exhibitors and members will be taken by citizens of Greenville. It is thought that this stock should pay a dividend of at least 8 per cent per annum.

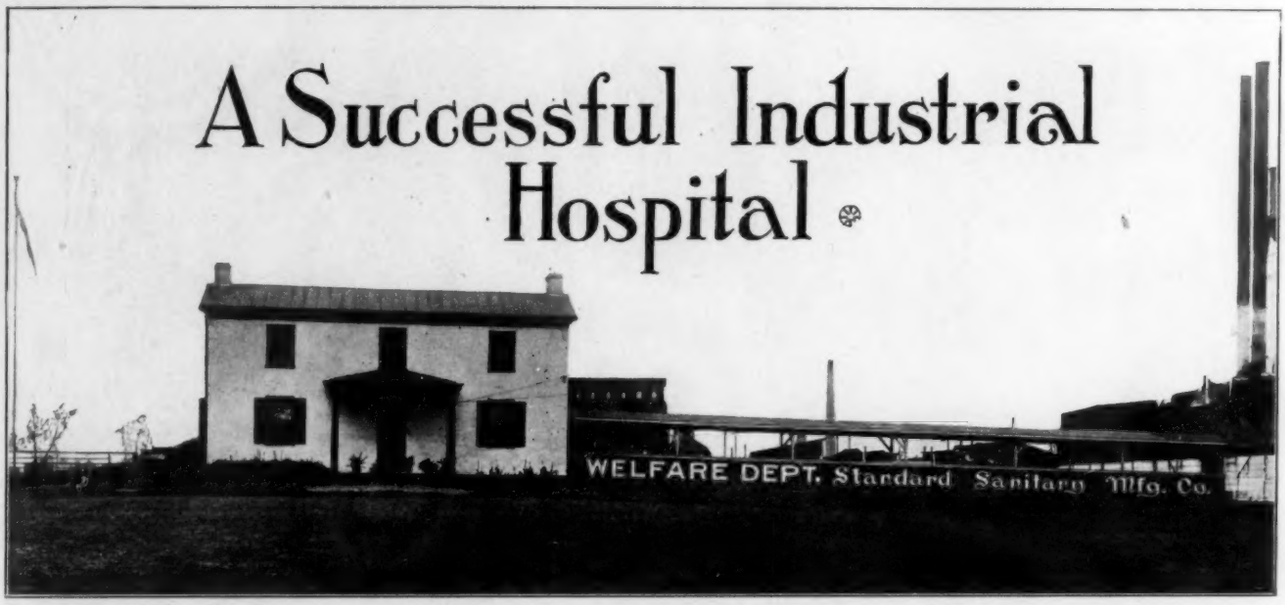
There will be nine directors, three of whom shall be President, Secretary and Chairman of the Board of Governors of the Southern Textile Association.

The officers shall be elected annually by the Directors, and will be as follows: President, Vice President, Secretary, Treasurer and Manager.

For further information address the Southern Textile Exposition at P. O. Box 572, Greenville, South Carolina.

Don't be the man with the vinegar face. Light hearted people dislike to look at you. Light hearted people are courteous people and they are too polite to shudder at you openly, but nevertheless they have your number and you are catalogued along with blue Mondays and rheumatism and overdue notes and other disagreeable things in life.

A Successful Industrial Hospital*



HOSPITAL OF STANDARD SANITARY MANUFACTURING CO., IMMEDIATELY ADJOINING THE PLANT.

The Louisville, Ky., plant of the Standard Sanitary Manufacturing Company, often referred to as the Ahrens & Ott works, is located in an industrial section of the city. Nearby is the foundry of the Louisville Car Wheel Company; a short distance south is a lumberyard, and a little way beyond is the establishment of the Standard Oil Company of Kentucky. The district is ribboned with railroad tracks, and the appearance of things is distinctly inartistic.

Yet the company has succeeded in establishing on a 14-acre tract, with a big flower-dotted lawn in front, a hospital building, the immaculate interior of which is in sharp contrast with the surroundings, and emphasizes the effort which has been put forth to make things as pleasant as possible for those who find it necessary to use it. The hospital immediately adjoins the plant and is concrete evidence of what the Standard Sanitary Welfare Department is doing for the employees of the big establishment, who have become enthusiastic over the service which it is offering.

The fortunate location of the hospital, in the midst of smoke and noise, was merely a happy circumstance. The big plot south of the manufacturing buildings has been held for possible expansion of the plant, and in the meantime gives ample space for hospital grounds. At the time when the photograph was taken, the flowers which had been blooming during the warm weather, had withered; but next spring the lawn will again be put in tip-top condition, with plenty of color in the form of floral decorations, while part of the ground will be used for garden purposes. The Standard Sanitary Welfare Department is the idea of Theodore Mueller, superintendent of the plant, who put it into operation May 1, 1915. It is not compulsory in any sense, but the extent of the service which is offered has resulted in 556 members enrolling. Of these 392 are married, and pay $1 a month dues, while 144 are single, and are charged 50 cents a month.

The unusual feature of the work is that it is not simply intended to take care of the employee himself, but also protect his family. And it not only provides treatment in case of accident, but likewise in the event of sickness. The man with a large family and a relatively small income, constantly fears the burden of doctor's bills, and the opportunity to escape this by becoming a member of the departments at $1.00 per month has appealed to a great many of the employees.

Every form of disability is thus provided for, as indicated by statistics regarding what has been done during the period which ended Dec. 1, 1915. Forty-one major operations have been performed, besides a great many minor ones; and twenty obstetrical cases have also been taken care of. The files of the department carry complete and convincing evidence of the value of the service to the families of employees, from curing the cold of little Valentine, aged 7, to relieving the attack of malarial fever which kept John Harpring from work.

The major operations are performed at two of the principal hospitals of Louisville, the Jewish and St. Anthony's. The hospital at the plant is not equipped for this work, though it has everything needed except bedrooms. These will be added later, on the second floor. In the meantime minor operations, such as the amputation of a finger or toe, can be taken care of nicely, all of the surgical instruments, sterilizing equipment, etc., being provided, besides the operating-table and a folding bed.

It is estimated that Dr. Edwin Bruce. who handles the medical and surgical work, is responsible for the care of 2,500 people, including the employees and their families. He has an assistant, Dr. I. Kerns, who responds when Dr. Bruce is busy with some other case. Both are employed on a flat basis, which is much more satisfactory to the department, because it insures the cost of the service not running over the revenues of the organization, which are now a little less than $500 a month.

Miss Offut, a trained nurse, is also regularly employed, and is on duty constantly, both at the hospital and in making visits to homes where her services are needed. Miss Bickel is the clerk of the welfare department, and handles

*By G. D. Crain, Jr., in The Dodge Idea.

Reception Room in the Hospital.

the records of the work, which are of considerable extent.

The "system" end of the welfare work may be of special interest. Every member is recorded on a card showing the name, department where employed, age, address, nationality, family history, personal history, etc. This card is kept in the file, and a record of the service given him is kept on it, so that at any time it may be ascertained to what extent he has been able to make use of the department.

Practically all of the new men employed by the company, join the department, and hence the card which is filled out in connection with the physical examination of applicants, is of special interest in this connection. The features covered are the name, age, nationality, etc.; general appearance, heart, pulse, lungs, blood pressure, vision hearing, etc., while a list of questions must be answered.

Every applicant who is accepted for employment, is also vaccinated, in accordance with the Kentucky law. Absence of vaccination might easily result in the closing of the factory by the health authorities, in case smallpox developed.

Superintendent Mueller emphasizes the great advantage of using the plan of physical examinations, pointing out that the company is thus able to distribute men much more advantageously to themselves and to the factory. For instance, a man with a defective heart would not be put in the enameling room, nor, in fact, would any defective person be employed for work that requires every faculty to be sound. Ordinary occupations become dangerous when handled by those who are not up to standard in every respect.

Men who are ruptured, for instance, are required to wear a truss. By careful examinations of this kind, the company is also anticipating the possibility of false claims for injuries which existed prior to taking the employment; and with the advent of compensation legislation this is all the more important.

Members of the welfare department are given membership cards, which are printed in green and red, to distinguish the holders of "single" cards from those who have secured the privileges for their families as well. The telephone numbers of the physicians and the hospital are shown on the back of the cards. All calls are handled through the hospital during working hours, and after that time the calls are made direct to the physicians. Cards

Consultation Room.

showing the time when calls were received and answered, and showing the number of visits by the physicians, are kept, so as to have a complete record of just what service has been provided. The nurse likewise reports regarding individual calls and conditions developed by her investigations.

The record of accidents is very complete. Space is provided for recording every feature of the case, even to the total cost of each accident, this including the cost of the hospital service, as well as the wages paid while the man is off, it being the policy of the company to take care of its men in this way. That its liberal policy is worth while, is shown by the fact that the company has not had a lawsuit during 1915, and no litigation growing out of accidents is pending.

The loose-leaf journal contains a record of accidents, is signed by the person injured or his foreman, to establish the facts in each case.

on the general features of the case, including the cost of the accident in terms of doctor's charges, hospital charges, wages allowed, etc.

Part of the records of the hospital and welfare department covers occupational diseases. Time lost, the diagnosis, and reference to previous sickness are the important points covered by these cards, which in such work as enameling and the manufacture of plumbing supplies are likely to develop important and suggestive data regarding the treatment of occupational diseases.

The human phase of welfare work is always more interesting than the purely statistical, of course, and it is therefore pleasant to be able to record that the general effect of the welfare department has been greatly to reduce the number of accidents in the plant. Mr. Mueller's estimate is that a reduction of at least 80 per cent has been recorded. His explanation is logical.

"If a man comes to work in an abnormal condition,"

The Operating or First Aid Room.

The form used for reporting accidents to the headquarters of the company at Pittsburgh, is interesting. It gives the history of the case, and then, for the purpose of bringing out information which may be of later value, a number of questions are asked.

Under the topic, "The machine, appliance or thing immediately causing the accident," the questions are, What was it?" "In whose control at the time?" and "Was it sound and in good working order?" Answers to these questions may suggest repair or rearrangement of the equipment.

Under the head, "Contributing Causes," the questions are as follows: "Carelessness of injured person?" "Negligence of a fellow workman?" "Violation of rules?"

A final report is also sent in to headquarters touching

he said, "and is suffering with a headache or from biliousness or any other temporary disorder, he is not in condition to do his best. He is thinking about how he feels, and he is likely to overlook the usual safeguards. The next thing is an accident.

"If a man is out of kilter now, his foreman sends him over to the hospital for treatment. He is examined, and if he is not fit for work, he is given medicine and sent home. Or else he is put in good condition to resume. The result is that the temporary physical handicaps which formerly contributed to increasing the list of accidents are now either removed or prevented from having an effect on the situation inside the factory.

"Again, mental troubles tend to take the attention of men from their work. The man with a sick wife or baby,

who may be worrying over the cost of their sickness and the character of the attention they may be getting, is likely to be careless and to run the risk of injury more or less serious. Now, if he is a member of the welfare department, he knows that they will have the best of care, and that in any event it will not cost him more than $1 a month."

The welfare department supplies medicines as well as medical and surgical treatment, filling prescriptions and furnishing everything in the way of drugs and supplies that may be needed. Thus the cost of the service as indicated by the monthly dues, is limited to a very small amount, no matter how numerous the calls of the individual family may become.

While the bookkeeping, etc., for the welfare department is handled through the office of the company, the fact is emphasized in its dealings with the employees that the hospital and the welfare work generally belong to them. A separate bank account is maintained for it, and a financial statement was posted at the end of the year, showing just how the money received was disbursed. The desire of the men to support their own institution is thus aroused.

The hospital at the Standard Sanitary plant is the only one of its kind in Louisville, and has attracted much attention. It consists of a reception-room, consulting-room, a room for dressing minor injuries and the operating-room. All of the equipment is up-to-date, the plumbing fixtures being unusually handsome and attractive.

In view of the immense improvement in conditions which the welfare department has brought about, both for the men and the company, and the spirit of cooperation which has been aroused, it is evident that the plan, which was undertaken largely along experimental lines, is an unqualified success.

Fumigation of Foreign Cotton.

BY H. M N.

In order to prevent the introduction and the establishment of the so-called pink boll worm (*Gelechia gossypiella*) and other insects from injuring the cotton, all cotton lint, baled or unbaled, grown in any foreign country or locality, is subject to all the provisions of Sections 1, 2, 3 and 4 of the Plant Quarantine Act. Amendment 3 to Regulation 7 of the Rules and Regulations Governing the Importation of Cotton Lint into the United States, requires the fumigation of all kinds of cotton imported on or after the first of February, 1916.

This law was to go into effect the 1st of February, 1916. At that time neither of the plants at the Port of Boston were completed and the government postponed the date of fumigation to the 15th of February. At the expiration of this time, for some unknown reason, the government postponed the law, but under date of March 3rd, a definite order was issued making the law effective on March 10th.

At the present time most of the foreign cotton that comes into the United States, especially Egyptian cotton, is brought to the Port of Boston. At this city there has been erected two plants for the fumigation of cotton and plans are under way for the erection of a plant at the Port of New York. Until the plant has been completed at New York, all cotton coming to this port will have to be sent through the Port of Boston, being shipped there by boat as the government will not allow any cotton to be entered at any port which does not maintain a fumigating plant.

The following is a description of the apparatus used by the Federal Horticultural Board while experimenting with the method of fumigation.

An appratus meeting in a small way, the above requirements has been devised and operated successfully in Washington and is herein described for the benefit of persons considering the construction of larger plants. Some additional suggestions are made in relation to a commercial plant. Briefly, this apparatus consists of a fumigation chamber or retort, an auxiliary chamber or generator, for the generation of the gas, and, thirdly, an air pump. One end of the fumigation chamber or retort is permanently closed, while the other end is provided with a heavy iron door swung on a hinge and held in place by six clamps. The gasket which is imbedded in the door comes into close contact with the flange of the retort, and when properly closed, greased and clamped prevents the air from entering the chamber during an exposure. This retort lies with its longest axis in a horizontal position. On the upper side of the retort there are four openings: The one nearest the door is provided with a vacuum gauge, which registers the degrees in pressure in units equivalent to inches of mercury; the second opening is fitted to an exhaust pipe which is attached to the air pump; the third opening is used to permit the air to enter the chamber at the completion of an experiment, while the fourth opening is fitted to a pipe which leads to the auxiliary tank or generator. The pipe leading from the fourth opening is provided with a gas cock and three enlargements. Two of these enlargements contain sodium cyanide, and the third glass wool. The object of the cyanide and the glass wool is to pick up any free sulphuric acid which may be mechanically drawn from the generator when the gas is permitted to enter the fumigation chamber. The auxiliary or generator is so arranged that it can be used either as a generator or as a fumigation chamber or retort, by closing the gas cock just above the cylinder. On the auxiliary chamber there is a tabulature used in introducing the chemicals into the generator. The air pump is cooled by a water system. On the generator there is a combination pressure and vacuum-gauge.

The cotton to be fumigated is placed in the retort, the door closed and clamped, and the air exhausted until the gauge registers about 25 inches, that is, the air in the chamber is exhausted until the pressure is the equivalent of about 5 inches of mercury. At this stage the suction is cut off, and the gas generated in the generator is passed directly into the fumigation chamber. It has been found advantageous to produce a partial vacuum in only the large chamber, and to have the gas generated in the presence of a normal atmospheric pressure. The gas may be generated in one of two ways: (1) the cyanide may be placed in the jar within the generator, the door closed and the acid and water introduced through the tabulature; (2) the acid may be placed in the jar within the generator and the cyanide in solution introduced through the tabulature. The latter method is preferable, especially where a glass tabulature is used as it eliminates all possibility of

breaking the glass through the heat generated by the combination of the acid and the water. In fact, to prevent breakage, it has been found advantageous to cool the water and acid which reduces the yield of gas. Where the cyanide is in solution, there is no heat generated until the solution comes into contact with the acid in the generator. This method has an additional advantage in that the yield of gas is increased. As soon as the generation begins, the gas cock above the auxiliary is opened and the gas is pulled over by the small amount of air remaining in the auxiliary. The gauge of the fumigation chamber drops approximately one inch after the air and gas have entered from the generator. The cotton is held in this chamber for 45 minutes in the presence of a vacuum of 24 inches, and at the expiration of that time the gas cock on the top of the retort is opened and the air is allowed to rush into the retort until the gauge registers zero. At this point the stop cock is instantly shut off, and the cotton held for another 45 minutes in the presence of the gas at normal atmospheric pressure. At the completion of this last exposure the vacuum pump is started, and the air and gas exhausted until the gauge registers 25 inches. The air is again allowed to enter the tank, and the tank is evacuated to 25 inches the second time. While the door is being opened, the pump continues to run with the gas cock of the retort opened which continues to wash out the remaining gas in the retort. If possible it is very desirable in removing the gas from the retort to continue operations until the gauge registers 20 to 29 inches. By this operation it is possible to eliminate practically all of the gas in the retort, and, in fact, where 29 inches are pulled, it may not be necessary to repeat the operation a second time, as is the case where the gauge registers only 25 inches.

In erecting a plant to comply with the regulations it is very essential to bear in mind that the fumigation chamber must be constructed to support a vacuum of not less than 25 inches for 45 minutes. Cylinders such as those used by wood preserving plants can be adapted to this process, and those interested in the construction of a fumigation plant will find it to their advantage to examine such chambers which are now operated by the following companies, whose names are supplied to the public through the Horticultural Board, by their circular letter of October 18th, 1915: Forest Products Laboratory, United States Department of Agriculture, Madison, Wis.; Eppinger & Russell Co., Long Island City, N. Y.; American Creosoting Co., Newark, N. J.; Federal Creosoting Co., Louisville, Ky. and Paterson, N. J.; Ohio Wood Preserving Co. Orrville, Ohio; Port Reading Creosoting Plant, Port Reading, N. J.; Southern Pacific Railroad, Los Angeles, Cal., and J. M. Colman & Co., Seattle, Wash.

In addition to the fumigation chamber it is also necessary to provide the plant with an air pump capable of producing a vacuum of 25 inches, or more. Information relative to vacuum pumps can be secured from manufacturers of such pumps.

A generator must be provided of sufficient size to generate the required amount of hydrocyanic-acid gas. Information on the construction of generators can be secured from dealers in cyanide, among whom may be mentioned: Rosseller & Hasslacher, 100 William street, New York City; F. W. Braun, 361-373 New High street, Los Angeles, Cal.; Eimer & Amend, New York City; Powers-Weightman-Hosengarten Co., Philadelphia; Thompson Chemical Co., Baltimore, Md.

Experiments have been made to examine the effect of hydrocyanic-acid gas in the presence of a partial vacuum, on various insects in cotton at different temperatures. The result has been thus far, that cotton fumigated is not effected at a temperature less than 75 degrees F.

Hydrocyanic-acid gas is generated by combining potassium cyanide or sodium cyanide, sulphuric acid and water. Recent experiments have demonstrated the desirability of using the cyanide in solution. Cyanide is soluble in water and can be easily dissolved.

Where cyanide is used in quantities it may be desirable to recover the cyanide from the gas by passing the exhaust over a caustic soda solution. Furthermore it is possible to manufacture Prussian Blue from the exhaust by passing it over a solution of copperas. This gas may also be disposed of by passing the exhaust into a furnace fire, provided precautions are taken to prevent sparks of fire from reaching the fumigation chamber.

The impression seems to prevail that owing to the poisonous nature of hydrocyanic-acid gas, it is unsafe to use. This is not true where the gas is intelligently employed and the proper precautions exercised. In fact, this gas has been in general and safe use for the past 30 years to control insects infesting citrus trees, nursery stock, stored products, and the home.

The present cost for fumigating a bale of Egyptian cotton is $3.00 Other bales such as China, Peruvian, etc., are not as expensive. After the plants in Boston have paid for the plant the expense of this fumigation will be reduced.

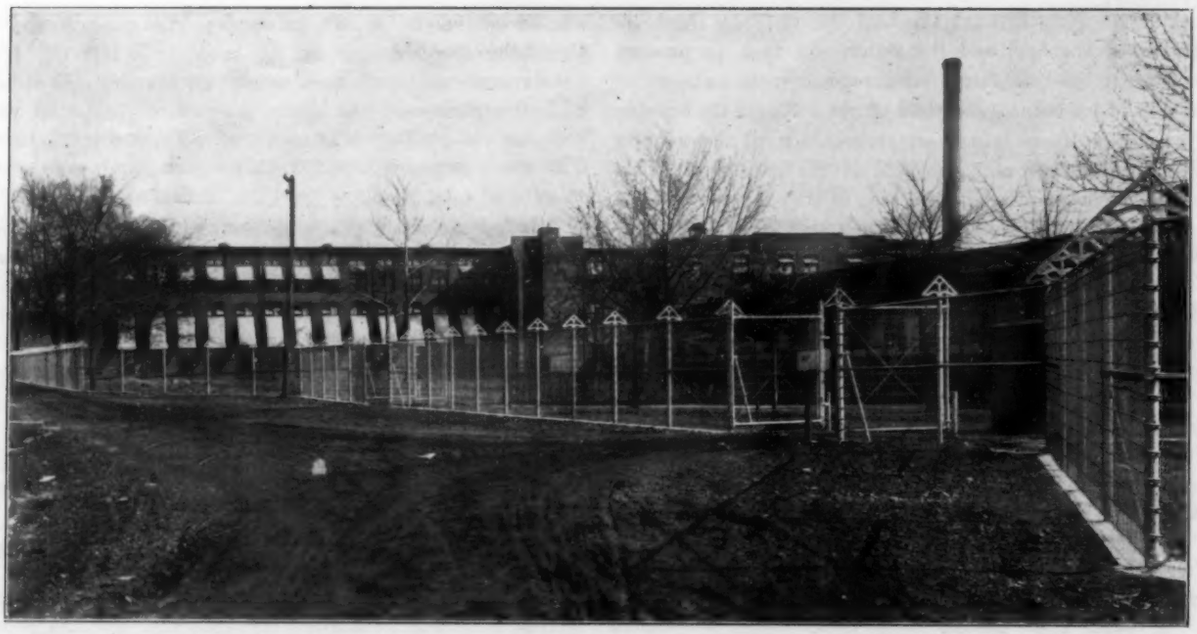
The Boston Textile Machinery Exhibit.

The outstanding item of interest from the textile manufacturers' standpoint for the month of April is the big textile machinery show at the Mechanics Hall in Boston, from April 24th to 29th inclusive. During this same period the National Association of Cotton Manufacturers will hold its annual convention in the same building. This year, in order to make the program even more perfect, it chances that the Metropolitan Opera season in Boston is occurring during the same time. This means that instead of having one attraction in Boston during this week, there are three of extraordinary value.

The question at once arises in the mind of the manufacturer intending to go, "Where shall I stop?"

At the corner of Boylston and Exeter Sts., only two minutes from Back Bay Station and only one block from the Machanics Building where the big show is being held, is located the Hotel Lenox with its 250 rooms, its famous cuisine and a restaurant service that is up to its standard as a first-class metropolitan hotel.

The making of finishing compounds, sizings, and starches of all kinds for the textile industry has been the speciality of The Arabol Mfg. Co., 100 William St., New York City, for years. Experience and scientific methods have enabled them to turn out products to suit any particular needs of the trade. Their goods have the enviable reputation of accomplishing in a most satisfactory manner all their manufacturer claims for them.



A View of the Steel Wire Fence Recently Placed Around the Property of the Exposition Cotton Mills, Atlanta, Georgia—This Fence Was Furnished by the Cyclone Fence Company, Waukegan, Ill.

A Method of Treating Lacerated Wounds.

BY R. L. HARRIS, M. D.†

I have adopted the following routine method of treating practically all lacerated wounds, which has proven highly satisfactory to myself and patients.

Wash the parts, if very dirty or greasy, with turpentine, followed by pure alcohol; if not particularly foul or greasy I use alcohol only. Forceps are better for holding sponges than the fingers.

After drying with sterile gauze, if there is any gaping of the wound, even slight, I pull the parts together with zinc oxide adhesive plaster, cutting it in such a way as to get a firm hold on each side of the laceration leaving a narrow strip to cross the wound; the narrow portion which comes in contact with the wound is dipped in alcohol before being applied. By a careful survey of the injury I can nearly always find a sound area for the plaster on each side. I consider the plaster an important feature; you cannot get close enough apposition with it to interfere with drainage, and much time is gained in the process of repair. This method has proven so successful that I rarely use sutures.

I next apply gauze, the thickness depending on the location and character of the injury. If it is the end of a finger, I make quite a club of the gauze, and over it place strips of adhesive extending some distance beyond. A snug bandage is then carefully applied, doubling the free ends of the plaster into the bandage, thus preventing any movement of the dressing. I now saturate the dressing with apinol by pouring it directly from the bottle.

It was my habit until a few months ago to redress a wound every two to four days at least, taking much time and causing the patient a great deal of pain. Now after carefully dressing a lacerated wound as described above, I instruct the patient to report in four or five days. After inspection I almost invariably repeat the above instructions; in other words, I do not redress the wound under ten days to two weeks, and almost without exception have obtained better results than ever before, and no pus in a single instance where I applied the primary permanent dressing. I have frequently had considerable difficulty persuading the patients that it was not necessary to dress the wound oftener.

Apinol has apparently five necessary virtues—it is anodyne, antiseptic, styptic, an absorbent of secretions and practically impervious to water.

There is usually enough oozing to saturate the dressing with blood and serum, which with the apinol, becomes almost as hard and solid as wood, and adheres firmly to the skin around the injured area, thus making an absolute waterproof dressing and acting as splint and protector to the injured part.

My first difficulty was in removing these dressings: no amount of soaking in water would soften them. Then I tried apinol, which did the work; it penetrates quickly and satisfactorily, rendering redressing easy and painless. I now keep in my office dram vials filled with it and give them to patients, instructing them to pour it on dressings an hour or two before they come to have them renewed.

This is a minor subject on minor surgery to the profession at large, but I feel that it will interest railroad surgeons from the fact that probably two-thirds of their work is treating lacerated wounds, and the above method will save them two-thirds of that work, and relieve patients almost completely of pain.

*Read before the Association of Seaboard Air Line R. R. Surgeons at Washington, D. C.

†Surgeon, Seaboard Air Line, Jacksonville, Fla.

If you are considering the installation of a first-aid room or emergency hospital at your plant, a request to the Hospital Service Department of the Frank S. Betz Co., at Hammond, Ind., outlining your problems, will bring valuable information without cost.

British Textile Machinery Exports and the War.

(Special Correspondence.)

The textile machinery industry of Great Britain, so far as relates to exports, reached its high water level, during the year 1908; a period of depression followed, from which there was a rapid recovery during 1913, which was seriously checked when Great Britain declared war. Probably no branch of engineering has suffered more than the textile machinery section during the last five months of 1914 and the whole of 1915. The total exports during recent years have been as follows:

		Increase	Decrease
1904.....	$24,000,000	$1,301,000	$ .....
1905.....	26,909,000	2,909,000	.....
1906.....	32,208,000	5,299,000	.....
1907.....	38,582,000	6,374,000	.....
1908.....	42,379,000	3,797,000	.....
1909.....	39,547,000	.....	2,832,000
1910.....	36,547,000	.....	3,000,000
1911.....	32,544,000	.....	4,003,000
1912.....	33,806,000	1,262,000	.....
1913.....	39,748,000	5,942,000	.....
1914.....	27,691,000	.....	12,057,000
1915.....	16,262,000	.....	11,429,000

It is notable that the exports for 1914, even after five months of war, exceeded those of 1904, which were at that time a record. The loss of exports due to the war, as compared with 1913 was nearly 31 percent and will probably be very much greater during 1916. During 1915 they exceeded 50 percent, as compared with 1913. The effect directly due to the war may be obtained by a comparison of the exports for the five months, August to December 1914, with the corresponding months of 1913. The figures given show a falling off of no less than 54,077 tons, valued at $11,390,000. The exports during the January-July period of 1914 were less than those of the corresponding period of 1913; the former were 94,267 tons, valued at $21,936,000, and the latter 101,885 tons, valued at $22,603,000.

Exports of textile machinery from Great Britain during the war period of 1914, with the corresponding period of 1913:

	1914		1913	
	Tons		Tons	
Aug.	6,148	$1,450,000	14,953	$3,494,000
Sept.	3,718	1,027,000	13,687	3,086,000
Oct.	3,729	1,061,000	16,600	3,629,000
Nov.	4,469	1,162,000	16,659	3,754,000
Dec.	4,071	1,061,000	14,313	3,285,000
Total ...	22,135	$5,761,000	76,212	$17,248,000

The United States was the only country to which the exports of textile machinery increased during the war period, August to December 1914, as compared with the corresponding period of 1913.

1914.	1913.
1,976 tons $667,000	1,138 tons $480,000

Two most important purchasers of British textile machinery, France and Germany, have ceased to import, the former because the important textile manufacturing district around Lille has been in the enemy's hands since the commencement of the war, and the latter on account of all means of communication having been cut off; apart from that it appears probable that Germany has been permanently lost to Great Britain, as an importer of textile machinery, in consequence of the organized campaign against the purchase by Great Britain of German made goods. Probably in the future Germany will make its own textile machinery.

The following figures show the effect of the war in the more important countries, during the last five months of 1914.

	1914		1913	
France	429 tons	$134,000	6,419 tons	$1,476,000
Germany ..	413 tons	118,000	7,444 tons	1,637,000

The permanent loss of British exports of textile machinery to Germany is a very serious one as the following figures indicate.

1901	$3,082,000	1910	$4,171,000
1905	4,618,000	1912	4,531,000
1907	5,088,000	1913	3,758,000

	1914		1913	
Russia..	1,389 tons	$518,000	7,443 tons	$2,265,000

The bulk of the imports into Russia during 1914 occurred during August, the first month of the year. The Dutch demand also showed a great decrease, from $1,123,000, to only $144,000. The Belgian imports of British made textile machinery, which, during recent years ranged from $1,584,000 to $2,400,000, has been completely wiped out, as the enemy has been in possession of the country practically since the commencement of the war.

British exports of textile machinery to Asia, include East India, China, and Japan, they all show a marked decrease for the five months of 1914, compared with the same period of 1913:

	tons.	1914	tons.	1913
India	10,834	$2,439,000	21,215	$4,046,000
China	656	192,000	1,662	307,000
Japan	2,220	487,000	9,258	1,296,000

It is possible that exports to the South American Republics would have fallen off, even if there had been no European war, as commerce on that continent was passing through a period of depression and difficulty. The figures show the five months comparison:

	tons.	1914	tons.	1913
South America	283	$216,00	5,041	1,056,000

For the year 1915, British exports of textile machinery, as compared with former years, have been as follows:

1915	1914	1913
All War.	Five Months War.	Peace.
$16,262,000	$27,691,000	$39,749,000
In tons	59,454 116,383	178,074

Comparing 1915, an entire year of war, with 1913, an entire year of peace, the total textile machinery exports to the several countries have been as follows:

	1913		1915	
Country	Dollars	Tons	Dollars	Tons
Russia .....$	4,776,000	15,308	1,675,000	3,698
Germany	3,763,000	13,917	.....	.....
Holland	1,977,000	12,171	562,000	3,143
France	3,533,000	12,630	1,402,000	4,042
Japan & China..	4,517,000	23,070	1,589,000	7,005
United States ..	1,200,000	3,939	1,440,000	3,502
South America ..	2,549,000	12,879	758,000	2,391
British India ...	9,600,000	50,437	6,110,000	26,580

The New American Factory Of The S. K. F. Co.

On th 4th of September, 1915, there was incorporated in Hartford, the S. K. F. Ball Bearing Company, of Hartford, Conn., with a capitalization of $2,000,000, having for its object the manufacture and sale of the ball-bearings known by this name.

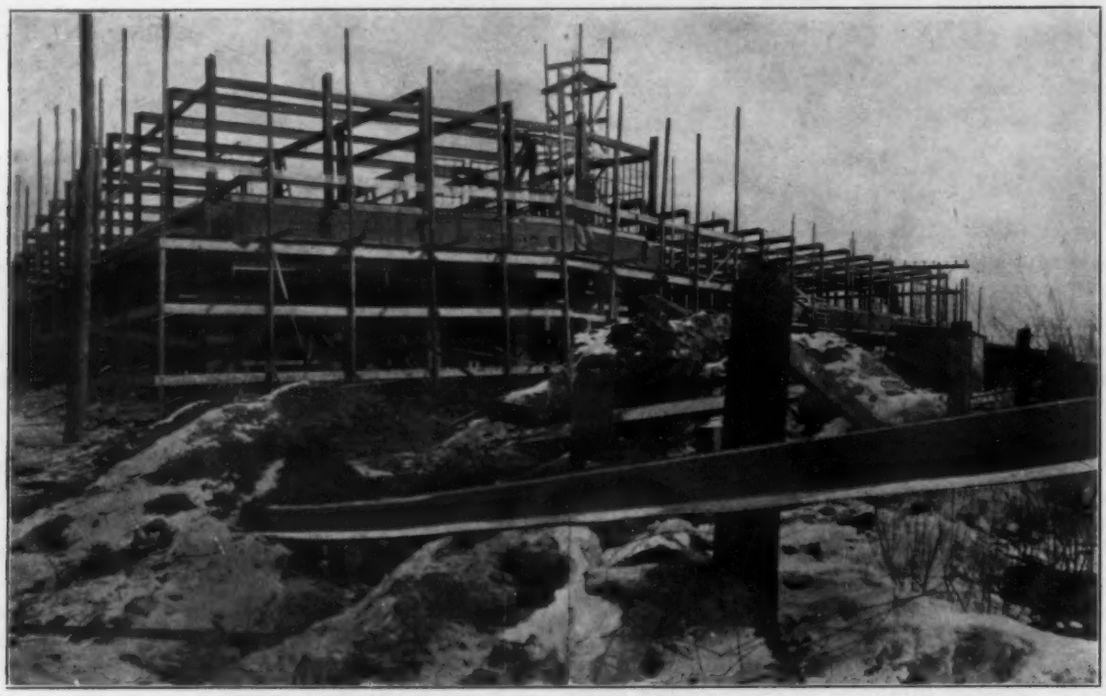
The S. K. F. ball bearing was introduced into the United States in the year 1910, three years after the patents for the invention exploited by the parent concern, "The Aktiebolaget Svenska Kullagerfabriken of Gothenburg, Sweden," has been granted. At that time the present American S. K. F. Ball Bearing company was incorporated with a capital of $50,000, as a selling organization for the bearings manufactured by the Swedish concern. Within a very shore time it became evident that this particular type of bearing had a large market in this country and the business of the company quickly extended, until at the present time it is one of the leading ball bearing importers in the United States with a sales organization covering the whole country.

Under these circumstances one of the problems of the company has been, how best to take care of its customers in America, so as to avoid undue delay in delivery, and it has, therefore, had to carry at its New York place of business one of the largest stocks of complete ball bearings in the country.

The possibility of manufacturing in the United States has long been under consideration, and after exhaustive inquiries as to the manufacturing facilities and the possibilities of producing in this country a product, which should, in every respect, be equal to the Swedish made bearings, steps have been taken to carry out this plan. The factory, for which a site has been selected at Hartford, Conn., which place the company found offered the class of skilled labor necessary for the production of a high quality mechanical product of this kind, is being built. A suitable factory site of about eight acres along the New York, New Haven and Hartford Railroad tracks was acquired and the erection of the first factory building started. Its present appearance is shown in Fig 1.

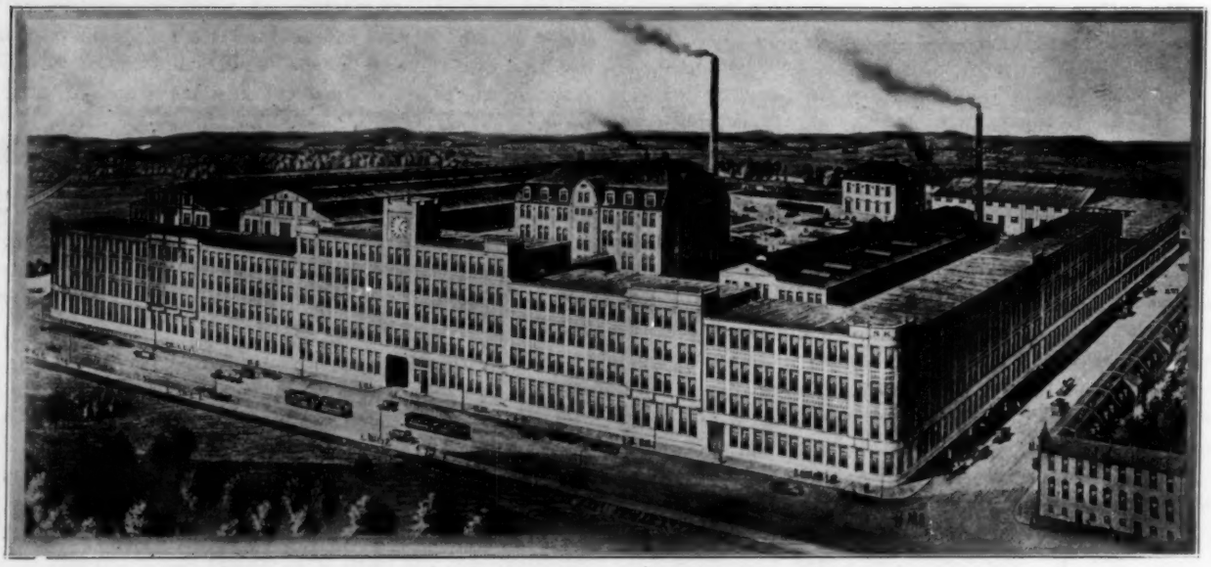
The special Swedish crucible steel, known as S. K. F. steel, used by the parent concern, with which the American company is closely allied, will also be used in the American-made bearings and will be imported from abroad for this purpose. The parent concern is placing its experience, special machines and all manufacturing facilities at the disposal of the American company, which is thus starting manufacturing on this side under the best possible auspices. With this factory, in addition to the Swedish source of supply, the new company will be in a position to take care of all demands made upon it.

To carry out the proposed plans there has been incorporated the new S. K. F. Ball Bearing company, in which prominent American interests are represented. This company will, as stated, be a Connecticut corporation and will have a fully paid up capital of $2,000,000. Among the directors of the new company will be B. W. Hanson, vice-president of Pratt & Whitney, of Hartford, Conn. The general selling policy of the company will not, however, be in any way effected by this change and the executives and other members of the old company will join the new corporation.



The New Factory Building at Hartford.

The First Swedish Factory.



The Swedish Factory After Eight Years' Growth.

Until the new factory is in a position to supply American-made bearings, the S. K. F. company, which has, since the war, been one of the few importers who have not suffered any interruptions in their source of supply, will continue as hitherto to import Swedish-made bearings as long as may seem desirable. This places the company in the fortunate position of having two sources of supply, and of not being pushed to develop its American factory quicker than it is able to organize a plant, which can be depended upon to keep up the present high standard of Swedish S. K. F. products with regard to quality. It is intended to start with a plant employing about 300 men, which will, to begin with, be able to produce only a portion of the bearings annually sold by the company in this country. Some idea of the size that the American factory may be expected to attain in the course of a few years can be gained from a comparison of the growth of the Swedish concern, which, starting in 1907 with a small factory (see Fig. 2) employing about 100 men, has, in the course of eight years, grown so that it now has a floor space covering six acres (see Fig. 3) and a force of over 3,000 men at the home factory alone, not counting its branches in various European countries.

With its own sources of supply for steel and its own manufacture of steel balls, which will continue to be imported, it is recognized that there is no ball-bearing concern in existence that has a better control of its raw material and other elements of production.

"Insuring the Coal Supply" is the title of a 24 page booklet just issued by the Link-Belt Company of Chicago. Its contents are primarily an article on the subject given by Henry J. Edsall of Philadelphia, which is reprinted from Coal Age. The booklet is well illustrated and shows the different methods of storing coal overhead when used by mechanical stokers, the reserve storage for the plant, pit storage, the question of weighing hoppers in handling coal, and many other interesting subjects. This booklet, which is known as Book No. C 249, is for free distribution and contains many features of interest for the manufacturer with the coal handling problem before him. Send for your copy!

Reversible Fans.

One of the problems arising around every cotton mill is the suitable handling of the raw material from the opening room to the point where it enters the machinery in the picking department. Many systems have been devised to secure the efficient handling of this material, avoiding at the same time as many of the common difficulties arising with such systems as is possible. A fan recently placed on the market for the economical handling of saw-dust, shavings, cotton, wool and other stringy material, is the reversible fan of the New York Blower Co., of Chicago, Ill.

The fan wheels in these fans are constructed with a cone shaped back of cast iron, into which the steel blades are cast solidly, thus eliminating all rivets, bolts and screws, which are liable to work loose and cause trouble. The wheel is so formed as to offer the least possible resistance to the material passing through the fan, and on account of this important feature of design proves particularly satisfactory with stringy materials, such as cotton, etc. The heavy steel plate housings and the small details of the fan construction, such as the high carbon steel shafts and chain oiling bearings with liberal oil cellars are fully up to the high standard to be found in all the product of this well known company. A request for catalogue R-F will bring to you a storehouse of interesting information in regard to the use of fan systems in the transporting of material.

A Nasmith comber, especially imported from England for the textile department at the A. & M. College, Raleigh, N. C., has recently been installed. This department, which is the textile school for North Carolina, has also a full equipment of combing machinery from the Whitin Machine Works, Whitinsville, Mass. The addition of this Nasmith comber gives this textile department a full complement of machinery for the production of fine yarns.

Pass & Seymour, Inc., have recently opened a branch office at 158 Purchase Street, Boston, Mass., with Geo. L. Hatheway in charge. The New England territory and the Canadian territory will be handled from this office.

The Effect of Idle Plant on Costs and Profits.

BY H. L. GANTT.

The theory which has been so long and tenaciously held by cost accountants, that all the expenses of operating a factory must be included in the cost of the output produced, has the effect of showing low costs when the factory is running at its full or normal capacity, and of showing high costs when the output is small. The small output is due usually to diminution in demand, which can, as a rule, be stimulated only by reduction in selling price, which the selling department invariably recognizes.

Under this theory of cost-keeping, the selling department and the cost department are, during times of depression, continually at odds, with the result that the selling department is often prohibited from selling goods because the cost department states that there is no profit in such goods; and more than one manufacturing industry has suffered severely from this policy. The fallacy involved in this method of cost-keeping is so subtle that for a long time it was not recognized that there was a fallacy, although the hard common sense of many manufacturers realized that there was something wrong about their cost accounting methods and oftentimes ignored the results obtained by them.

During the last few years many leading manufacturers and accountants have recognized the existence of the fallacy, and some have actually pointed out what the fallacy is. The financier justly claims that if the plant is to be prosperous the output must be sold at a sufficient price to pay for the operation of the plant and to leave a reasonable profit. In order to do this the selling price when the product is small must naturally be greater per unit of product than if the product were larger, but in such times it is usually impossible to get a larger unit selling price.

A few years ago many financiers and industrial leaders thought they had solved the problem when they had adopted a fixed selling price, which they maintained during times of prosperity and times of depression. An illustration of this is the price of steel rails fixed by the United States Steel Corporation, but the slow business recovery from the depression of 1907 and 1908 does not indicate that this policy has been entirely successful. When a plant is operating at less than its full capacity, it is quite evident that the expense of maintaining a certain portion of that plant in idleness must be borne somehow. The old theory that it must be borne as a part of the cost of the articles produced is rapidly giving way to the theory that it is a business expense and not chargeable to the articles produced.

Under this theory of expense distribution a plant which was running at only a small fraction of its capacity might make a good profit on the articles it produced and yet lose money, because of the necessity of deducting from the profits the expense of maintaining a large unused plant and the permanent organization needed to operate it. Another way of expressing the newer idea is that the output of a plant should be charged with only that expense needed to produce it, and that all other expense must be carried as a business expense and put in the profit and loss column. Under this theory it is readily seen that costs will remain constant whether the plant is operating as a whole or only in part unless there is a change in price of material, rate of wages, or method of manufacture; and the salesman will have a definite cost on which to base his selling price.

Idle plant is just as much a source of expense under the new theory as under the old, but under the new it is charged to the business, whereas under the old it is charged into the cost of the product. It is easily seen that a manufacturing concern which bases its policy on the newer theory will very soon get the better of those rivals, which adhere to the old method of cost accounting.

This discussion leads directly to the consideration of another very important subject, namely, is it ever profitable to manufacture at a loss? This sounds like a flat contradiction, but it is really a subject of great importance. For instance, let us assume that it would cost us $100,000 per year to maintain our plant in idleness but in condition to run, and to maintain the skeleton organization of officers needed to put the plant in operation again. Would it not be better for us to operate that plant during the year and maintain our whole organization, if the loss incurred thereby would not exceed $100,000? If at the end of the year, business should be offered two plants, one of which had followed the first policy, and the other had followed the second policy, the one which had followed the second policy would certainly be in far better position to take advantage of new business than the other, for it would not only be spared the expense of hiring and training a new set of operatives, which is always very great, but it would be in a position to execute the orders promptly. It is clear that, although each plant had actually lost the same amount of money during the year, the one that had its orgnization intact and ready to fill orders would be ahead of the other from a financial standpoint by the cost of hiring and training operatives, and from a business standpoint of being ready to fill orders promptly.

It would therefore seem that to shut a plant down, from whatever cause, is a very risky proceeding unless it is not intended to open up again. Mr. Carnegie recognized this fact and his action in accordance with it was one of the most potent factors in enabling him to get the better of his competitors.

At the meeting of the American Society of Mechanical Engineers at Buffalo on June 25, 1915, one of those who discussed my paper on "The Relation between Production and Cost" made the statement that it was the duty of an industry to take care, during times of depression, of those who had served that industry in times of prosperity. It is not my intention to emphasize the morality of this subject, but I believe it is possible to demonstrate that a proper industrial policy will show that it is to the advantage of a manufacturer to do as far as possible just what has been contended.

It is an economic principle that the consumption of articles increases rapidly with the reduction in cost to the consumer. If, therefore, during times of depression manufacturing companies will recognize that they cannot expect to make profits when nobody else is making profits, and are willing to accept their portion of the loss which is incident to the depression, by selling at a lower price, they can many times give their employees constant employment, and at the end of the period of depression find themselves in good con-

*From The Annals of the American Academy of Political and Social Science, Philadelphia.

dition to take advantage of returning prosperity and make up the losses incurred, while their more conservative competitors, who shut down their plants, are preparing to manufacture. Moreover, such a policy as this would, during times of depression, continue the production of wealth on a much larger scale than has heretofore been customary, and even though the wealth thus produced would not accumulate in the hands of those who are accustomed to receive it, it would nevertheless be an asset to the country and make possible the more rapid return of prosperity.

The policy of holding up selling prices to a point at which few can afford to buy is, the writer believes, not only detrimental to the country at large but in the long run to the individual concerns doing it. It is a form of protection designed to offset or counteract the natural laws of the survival of the fittest, and whether applied to individuals, industries or nations this law is inexorable, and any economic or financial policy founded on the theory that it can be done away with must ultimately fail.

The conclusion, therefore, is that continued employment and hence the continued production of wealth is more important to the country at large, and hence to individuals in that country, than large profits which necessarily go to a comparatively small number.

Under the Rose.

BY A. M. OLIVER.

It is surprising to note some of the things brought to light by efficiency engineers in their daily work. These peculiar things are not the result of time studies but are conditions that exist that the management know little or nothing about. They are conditions that tend to make competition hard to meet because they cost the company money for which nothing is received in return.

In one mill in which I was working I found that in one department there was a man paid 1½ hours for working noon hour each day. I asked what was this man's duty, and was unable to find that he did anything. It leaked out that the man had asked for a raise in wages and that the foreman, being unable to secure it for him, added one and one-half hours to his wages and marked the pay roll "Worked noon hour." I found that this man had received this extra pay for about two years. Naturally he was much grieved when we canceled this arrangement.

In the same department the sweepers were allowed to come in about one hour ahead of the rest of the help. When I inquired into this all I could get from the foreman was the fact that he thought it gave them a start. Each sweeper had a room about 90 x 150 to sweep and had ten hours in which to do it. We arranged to have the sweepers work the same number of hours as the rest of the help.

I found that the foreman of one department was paid on an hourly basis and that he worked overtime every night in the week. He also had about eight men work every night until 10 P. M. in order to get his kier lots hauled into bins. After working with this foreman for about a week I found that he finished his work at about 4 P. M. and that working eight men and himself was only a method for receiving time and one-half.

I found that the truckers were paid by the piece and that two of the truckers were making more than the second hand; that inspectors were paid by the piece and that by checking the total pieces inspected each day, that the company was paying for about 1200 pieces more than was actually produced; that small amounts were added to the pay roll at any time and entered as overtime and that operatives were not docked when they left the mill early or entered the mill late; I found that no order of work was issued to the singe houses and that the lack of these instructions was the direct cause of two or three bales being bleached incorrectly every week. The bleachery was always billed for these mistakes.

The overseers in one mill were in the habit of having a man go to their homes once or twice a week and saw wood, clean windows and various other kinds of work and charge the time to the company. In another case it was found that 15 operatives were allowed to leave the mills about 12 minutes before quitting time each night in order that they might catch a car. They were paid for full time. A word to the railroad company proved that they were glad to change their schedule to accommodate the operatives.

Overseers have been known to add extra pieces to a man's record in order that his pay would be larger, although the operative had not done the pieces he received credit for. A master mechanic was found who carried four mechanics more than he needed in the anticipation that he might need them some time.

These are some of the things that one runs across when working on plant reorganization. They are not results of time studies but are simply conditions that exist and that the management knows nothing about. They are liberties that the various overseers and foremen have extended to themselves. They are conditions that are hard to correct without hurting the feelings of the persons who elected to install them. Such conditions cost a lot of money for which the company receives nothing. They are conditions that tend to make it hard to meet competition especially, when there are so many competitors running their factories on a scientific basis.

Desires to Handle American Goods.

Nicolas T. Marameros, 15 Aristotelous St., Athens, Greece, advises that he desires to represent American manufacturers. He says that former sources of supply in Europe for all kinds of commodities are shut off by the present war, which seems to be of long duration. He will be glad to have by return mail from firms not already represented in his country, samples of the line of goods manufactured and the lowest price f. o. b. New York.

There is now a fairly good opportunity of our doing business in his country, where according to appearances we are destined to take the lead; a proof of this being the large quantities of different commodities which have been imported into his country during the last ten years. First-class American references are at the disposal of interested parties. Correspondence may be in English, and should be sent direct to the inquirer.

"I am satisfied that all human beings are entitled to the essentials of life, that is to say, to water, to air and to land."

Mill Conditions and Market Reviews.

Southern Mill Situation.

There is undoubted prosperity abroad—sound, growing prosperity. Great new business propositions are being launched in the South, reinforced by big natural undertakings. Along with the new developments the older concerns are planning, or have already executed, new business-getting campaigns are being inaugurated. This is the kind of business that stimulates and revivifies the entire circle of trade. Southern cotton mills are getting the maximum share of this new prosperity. The old mills, too, are turning out not only more but better work, due largely to the new equipments, mechanical and otherwise, that have been installed recently in many mills. Nor has the cotton mill man neglected to go afield and create business for himself. More and more the Southern manufacturer is applying the most modern and intensive business-getting methods with success.

In an interview with Cotton's representative, Jno. F. Scott, Superintendent of the Edna Cotton Mills, Reidsville, N. C., said:

"Regarding business generally with the cotton mills, my information is that it is much better than it has been for a few years and the outlook is promising for the future; however, with the existing conditions abroad, it is difficult to forecast the business future, as events may happen any day to change conditions materially.

"The Keating-Owen Child Labor Bill appears to have the support of a majority of our national representatives, and unless other legislation prevents consideration, it is liable to become a law, which, in the opinion of a majority of the parents of children between fourteen and sixteen years of age, working in mills, would be a mistake; many families, particularly widows with children of the above age need their assistance; again, the enactment of such a law works a hardship on the working people generally, from the fact that the families will not only be deprived of the income of children between fourteen and sixteen years of age, but in the event of the Keating-Owen Bill becoming a law, and the mills thereby being compelled to pay higher wages for work, it will increase the cost of production to some extent and add to the cost of material for clothing, thereby affecting not only the earnings of the families but the expense of living as well; it is to be hoped that the child labor matter will be left to the different states for adjustment by their representatives in the state legislatures."

Additions and improvements are noted as follows:

The Berryton Mills, Berryton, Georgia, will shortly double the capacity of its plant, making it a ten thousand spindle plant.

The Spencer Mountain Cotton Mills, Lowell, N. C., are adding new machinery to increase their capacity about twenty-five per cent.

The Liledoun Mfg. Co., Taylorsville, N. C., has taken over the Watts Mfg. Co., with 1920 spindles. They will install 4080 additional new spindles, with accompanying machinery.

The Oriental Textile Mills, Houston Heights, Texas, will add considerably to their plant in the near future, and make extensive repairs.

The Meritas Mills, of Columbus, Ga., have made arrangements to increase their plant forty per cent of its present capacity, the mill now containing 28,000 spindles and more than 500 looms. The increase contemplated will make this plant one of about 40,000 spindles, the new extension to cost about $250,000. The new addition will manufacture wide cotton cloth for use in the oil cloth and imitation leather trade.

J. A. Smith and Walter Pringle, Gastonia, N. C., have purchased the Walterboro (S. C.) Cotton Mill. They will install machinery and otherwise improve so as to spin fine yarns.

An expenditure of $100,000 for additional buildings and $55,000 for new machinery has been decided upon by the Linn Mills Co., Landis, N. C. The buildings will be of standard mill construction, 100 x 100 and 100 x 42 feet. The machinery will include 3,876 spindles. Electric power will be used.

It is reported that the Martel Mfg. Co., are to double the capacity of their mill, and machinery for this purpose has already been ordered. The present capacity of the mill is 10,000 ring spindles and 300 looms. This is one of the mills of the Farish Company of New York, with general offices at Columbia, S. C. Incidentally, it is of interest to note that the several mills in the group controlled by this organization, among which are included the Palmetto Cotton Mills at Columbia, the Martel Mills of Atlanta, and several others, are repainting the interior of the mills and doing considerable repair work on the mill villages. Allen Jones, Jr., of Columbia, S. C., is the Purchasing Agent for several of these organizations.

The Planters Oil Co., at Albany, Ga., are interested in installing a plant for the bleaching of linters for nitrating purposes. No machinery has been bought. R. G. Riley is secretary and manager.

Bleached cotton linter equipment may be installed by the Farmers' Cotton Oil & Trading Co., Uniontown, Ala. Data and prices on the necessary machinery are wanted by the company, J. F. Glass, general manager.

The Union Bleaching & Finishing Co., Greenville, S. C., are building a new machine shop in connection with their plant 100x 100 feet, which is to be fully equipped with the necessary machinery for doing the necessary repair work around this plant.

The Panola Cotton Mills at Greenwood, S. C., are reported to be considering the manufacture of yarn for commercial purposes as well as sheetings, which has been their line of goods previously. This mill is equipped with 17,000 spindles and 380 looms.

The Southern Aseptic Fibre Co. incorporated with $50,000 capital stock will manufacture absorbent cotton, bleaching, gauze, gun-cotton and surgical dressings at Columbia.

S. C. A three-story plant building will be erected. Paul A. Schulz who has been engaged in this line of business, and Joseph D. Miot, of Columbia, are the incorporators of the company. Mr. Schulz will be manager. The Sanitary Aseptic Package Co. will operate as a subsidiary, manufacturing a sanitary absorbent cotton container designed by Mr. Schulz.

At a cost of $100,000 the Corsicana (Tex.) Cotton Mills will double capacity. The Corsicana company will build a two-story main mill addition, picker-room and four warehouse sections, of brick mill construction.

The establishment of a cotton mill at a cost of about $100,000 at Greenville, Ala., is contemplated; it is proposed to use brick plant buildings, power plant and cottages owned by Gulf Red Cedar Co. Dr. J. A. Kendrick and others are interested.

The Opelika, (Ala.) Cotton Mills has purchased the strip of land adjacent to its mill building and it is expected that the plant will be enlarged. At a meeting of stockholders on April 11 action will be taken in matter of proposed increase of capital stock from $150,000 to $500.000.

Plans are moving rapidly ahead for the construction of the 19,000 spindle mill which the Adrian Manufacturing Company will erect near Mount Holly, N. C. R. C. Biberstein is architect and engineer and the equipment will consist of 13,000 producing and 6,000 twister spindles.

The Texas Cotton Mills Co., McKinney, Tex., will double their dye plant capacity and make other improvements. It has purchased the necessary equipment, and will erect a building by its own force.

It is reported that the Chattanooga Aseptic Cotton Company will build a $75,000 plant for manufacturing aseptic cotton for surgical and other similar purposes.

A movement has been launched at Ennis, Texas, for the organization of a $200,000 stock company which will build and operate a large cotton mill. R. B. White is at the head of the movement and is being given much encouragement. The Ennis Commercial Club indorsed the proposition and has pledged its support in placing the stock and raising the necessary funds. It is planned to have the mill in operation by the time the new crop of cotton begins to move.

The Griffin, (Ga.) Mfg. Co. is making many improvements including the installation of 200 new Draper looms in place of the old check looms.

The incorporators of the Millneer Mfg. Co., Statesville, N. C., have abandoned their plans and instead thereof will install 3,000 additional spindles in the Statesville Cotton Mills. The looms of the Statesville Cotton Mills have been sold to the Clinton (S. C.) Cotton Mills.

New England Mill Situation.

Apprehension over developments in the labor field during the coming summer continues to disturb New England manufacturers. At New Bedford, where a strike in the Gosnold mills persisted for a month, the manufacturers won, and they are standing together better to contest the united demands of labor unionists than has been the case for some years. But the cost of living has risen to such heights and the opportunities for employment in other than textile industries are so numerous, that the lack of immigration is keenly felt and with the advent of warmer weather expectations of unusual demands from operatives are anticipated.

The mills have all the work in hand that they can attend to. The whole section has been suffering for weeks past from a congestion of freights and from intermittent embargoes imposed in the hope of relieving the situation. Goods coming from the South to be finished, and goods en route out of New England, have been held up in all sorts of places, while in many instances the railroads have been compelled to refuse shipments at the source. The congestion is due quite as much to the immense business as to any other one cause, the traffic of the New Haven road being saturated even in moderate times. The conditions in and around the New York terminals have contributed greatly to the delays in deliveries.

Generally speaking there seems to be less anxiety among New England manufacturers concerning a cessation of the present good trade than appears to obtain elsewhere. The New England states are strongly pro-ally and financiers and men of large affairs contend that until England gives some signs of desiring peace, it is hopeless to look for such a thing, and incidentally to worry about what may come when peace talk becomes official. It is quite plain to see that business men in this section are going ahead with their plans on the assumption that the war will last for the balance of this year at least.

Manufacturers and their representatives in the markets are paying close attention to the export business that is offered and there are more cotton goods being made for export in New England at the present time than any of the present generation of mill men expected to see in their time. This business is not the outgrowth of demands from the warring countries themselves, although they have figured in the buying that has taken place. Most of it has come from neutral countries, from the American continental and island markets, from the Scandinavian peninsula, the Philippines, and from Australia, New Zealand, and South Africa.

One hosiery concern alone has more than 400 machines employed steadily on merchandise sold to various countries where the goods are eagerly sought after on their merits. A very considerable foreign business has been booked for napped cottons of all sorts, one concern in particular having sold 20 percent of its output for foreign shipment this year. The business that is being done in bleached cottons of all grades for export is a very considerable factor in the trade. The printers have been doing as large a foreign business as they could handle and still have many very satisfactory orders to fill. Some concerns have regained trade in South America on brown and bleached sheetings, particularly in West Coast countries, which was taken from them through infringements of brands rather by the cheapness of merchandise offered.

One concern handling fine and fancy cottons did a business of $500,000 with Cuba last year of which four fifths was comprised of goods made in New England. The business that is being done with Argentina on some New England merchandise will prove surprising if the government ever decides to detail its figures of shipments more comprehensively. The purpose of many manufacturers is to establish the goods in the markets with merchants who can be relied upon to carry them under normal conditions, and who will be assisted in competition, after the war is over, in financial and other ways.

Market conditions during the early part of the month

seemed somewhat uncertain. About the middle of the month a change of importance was noted when print cloths grew stronger and added demands came upon the mills for goods to be made for shipment in the last half of this year. To a partial extent this business was regarded as somewhat speculative but the feeling prevails that cotton cannot be depressed much below its present level this year and in the event of a cessation of European hostilities it is fully expected that cotton will sell at very much higher figures. Staple cotton goods are the cheapest textiles in the market today, and it has been history that the best demand for cotton staples begins after the first flurry of high prosperity has passed and high prices in all other lines make consumers turn to the serviceable and relatively cheap cotton goods.

It is regarded as particularly significant that such staples as percales, shirting chambrays, ginghams, and prints, have sold very well at advancing prices and they have been going into consumption so far as retail purchases are concerned. The fall output of the largest producers of these goods has been placed under order and the goods have been withdrawn from the market. Bleached goods have been produced in larger quantities in the past six months than ever before and they have been distributed and called for in larger quantities. The situation in the markets at the present time promise a continuation of the great demand from staple and fine bleached goods.

The staple gingham markets are very strong, buyers being quite willing to pay the high prices that are prevailing, and based on 7½ cents a yard for Lancasters and Amoskeags. The lower priced lines of dress ginghams are also sold up closely and some cutters have been willing to pay better prices for seconds than they paid for firsts less than five months ago. Fine ginghams are scarce, partly because of color conditions, but more largely because of the abnormal demand for them which came in when plaids became fashionable for general wear.

The situation in fine and fancy goods is without parallel. The market demand is far in excess of the ability of mills to meet it. There is hardly a fine goods mill in the section that has not booked some goods for delivery through the balance of this year, and on many goods, some of a staple character, the earliest deliveries on new orders that can be arranged is September 1. The prices that have been paid to some New Bedford mills for fine yarn goods are the highest ever touched, the boom period of 1907 being no exception. Such staples as fine nainsooks, lawns, cambric muslins, longcloths and india linens, have commanded premiums for spot shipments. Anything in the way of a high novelty, whether in the form of a voile, marquisette or fancy stripe, will bring the mills' asking price if anything like an early delivery can be assured. Numbers of converters are pressing for goods for the summer season to be delivered right up to the end of August.

The dye troubles are numerous but not wholly insuperable. Converters are not able in many instances to receive assurances from finishers as to the colors sought or the patterns desired, yet they manage in one way or another to conform their requirements to what manufacturers can produce. It is a frequent thing to hear manufacturers state that if converters could arrange finishing plans to their liking the worst sort of a runaway market would ensue.

There is hardly an idle plant in this section, and where there is idle machinery it is not due to a lack of orders or an opportunity to get them. There is some overtime work going on but no all night operations are countenanced. Many of the fine goods mills are unable to keep yarns supplied to the looms and they are operating carding or spinning departments overtime. Some of the printing and finishing companies, and several of the bleacheries are forced to keep night forces at work in order to keep the huge output balanced. But in these instances only a very limited part of the plants are being worked and it is doubtful if help could be secured for any sustained night operations.

While fine goods mills are making a great deal of money and have a great deal of business booked, there are many other concerns that are exceedingly busy and are laying by good profits to be used against the reaction that is expected to set in violently some time in the future. The yarn mills are running in full, some of them engaged on the finer numbers having all the business they will take for this year. This is especially true of mills making combed yarns. Some of the quilt and damask mills have never been busier. Mills making crashes and towellings are exceedingly busy and at the most profitable prices they have recorded in years. The napped goods mills were fearful of a light business because of the scarcity of dyes, which are sopped up freely in loosely spun yarn fabrics. But it has developed that the Tremont & Suffolk mills have all the orders they can take care of, the Nashua blanket lines are off the market for the balance of this year, and the big Amoskeag lines are fully under order as far ahead as orders will be accepted.

The intense activity in machinery concerns has no parallel in American history. It was stated a few days ago by one of the largest factors in a great machinery concern, that his plant alone could book orders for 1917 for 350,000 spindles if it cared to accept the business. To be sold up a year ahead has not been an uncommon experience for some mill machine shops, but to have actual orders on the books for that time, and be offered beside cash orders for machines not to be delivered in two years is quite out of the ordinary. Nearly all the shops are behind on orders owing to the constant pressure from customers whose needs must be met even if new work waits. One concern is engaged to deliver a mill equipment in July and cannot possibly complete it before October unless something unforeseen occurs to speed up the workers. The situation in the machine shops is a particularly delicate one in the matter of help for the reason that the drain from ammunition factories is constant and the restlessness of machinists is being stimulated by all sorts of agitation.

The Yarn Market.

The yarn situation continues very much along the lines of last month and the market is still a spinners' market. The early weeks of the month found 2-ply fine combed lisle and mercerized yarns in good demand for prompt and nearby deliveries. Prices of carded knitting yarns were a little softer as knitters were not buying freely of these qualities. Spinners of weaving yarns were very firm in their quotations during this period, but weavers were not disposed to buy freely.

The combed yarn situation practically saved the day, as demand was brisk and prices well toward the top. The demand for combed Sea Island was good and prices were

strong. Sales of 40's 2-ply on skeins were made at 66 and 67 cents; 50's 2-ply on skeins 73 cents; 60's 2-ply on skeins 75 cents; 80's 2-ply on skeins 92 to 94 cents. A sale of 40's 3-ply combed peeler skeins was made at 48 cents. There was considerable talk of substituting carded yarns for combed yarns, and two or three hosiery manufacturers were reported to be using carded mercerized yarns, but the demand for combed yarns still continued and prices mounted higher as the time passed on.

Later in the month the prices on combed yarns increased and there continues to be a good demand for small quantities of 50's 2-ply to 80's 2-ply combed lisle and mercerized yarns. The carded yarn situation, however, is not as satisfactory as is the case with combed yarns. The demand has not been up to the spinners' expectations and the prices occasionally sagged. Some spinners have accepted contracts on the basis of 19 cents for 10's carded cones, while others are quoting 21 to 21 1-2 cents basis of 10's for ordinary quality. High grade carded yarns that make a fair substitute for combed yarns are in good demand, and spinners handling these yarns are reported to be fairly well sold up. The weaving lines continue active with a better demand for yarns especially in coarse numbers.

Following are recent quotations in the Philadelphia market:

Southern Single Skeins.

8s	18½ @19	10s	19 @19½
14s	20½ @21	16s	21½ @22
20s	22 @22½	24s	24
26s	24 @24½	30s	28½

Southern Single Warps.

8s	18½ @19	10s	19½ @20
12s	20½	14s	20½ @21
16s	21½	20s	22
24s	24 @24½	26s	25 @25½
30s	28½ @29	40s	36 @37

Carpet and Upholstery Yarns in Skeins.

8-4 slack	18½ @20	9-4 slack	20 @20½
8-3-4 hard twist	18½ @19		

Southern Two-Ply Skeins.

8s	20 @20½	10s	21
12s	21	14s	20½ @21½
16s	21 @22½	20s	23½
24s	26½ @27	26s	27½ @28
30s	29½ @30	40s	37 @38½
50s	49 @50		

Southern Two-Ply Warps.

8s	20 @½	10s	21
12s	21½	14s	22 @22½
16s	23	20s	24 @24½
24s	26½ @27	26s	27½ @28
30s	29½ @30	40s	38 @39
50s	49 @50		

Northern Two-Ply Carded Peeler Skeins.

20s	27½ @28	24s	29 @29½
26s	29½ @30	30s	32 @33
36s	36 37	40s	42 @44
50s	50 @52		

Two-Ply Combed Peeler Skeins.

20s	32 @33	24s	34 @36
30s	39 @42	40s	47 @49
50s	57 @59	60s	66 @67
70s	73 @76	80s	80 @84

Southern Frame Spun Yarn on Cones.

8s	19 @19½	10s	19½ @20
12s	20 @20½	14s	20½ @21
16s	21 @21½	18s	21½ @22
20s	22 @22½	22s	22 @22½
24s	23 @23½	26s	23½ @24½
30s	25½ @26		

Northern Mule Spun Carded Yarn on Cones.

10s	22 @22½	12s	22½ @23
14s	23 @23½	16s	23½ @24
18s	24 @24½	20s	24½ @25
24s	25½ @26	26s	26 @26½
30s	27½ @29	40s	37 @38

Northern Mule Spun Combed Peeler Yarn on Cones.

10s	29 @29½	12s	29½ @30
14s	30 @30½	16s	30½ @31
18s	31 @31½	20s	32 @32½
22s	32½ @33	24s	33 @33½
26s	33½ @34	30s	37 @38
36s	40 @41	40s	45 @46

Cotton Comment.

BY H. AND B. BEER.

New Orleans, Mar. 15th., 1916.

The technical position of market having been made stronger by reason of the heavy liquidation attending the maturity of March contracts last month, values have advanced about $4 per bale since our last review.

Except for the uneasiness in connection with recent developments in Mexico, the international political situation is more favorable, as Germany and Austria have been impressed with the fact that Congress and the American people are supporting President Wilson in his foreign policy.

There developed a better trade demand on the late decline which has continued to the present moment, Russia, Japan and American mills being the principal buyers.

The manner in which the consumption of cotton is increasing in the United States is a revelation. According to the report of the U. S. Census Bureau, issued to-day, American mills consumed 639,000 bales in February vs 493,000 in February of last year, making the total for the seven months ending with the close of February 4,167,000 bales against 3,244,000 for the corresponding time last season.

As the increase in the consumption of cotton in America from August 1st. last to the close of February was 923,000 bales larger than for the corresponding period last season, when the total for the whole season was 6,009,000 bales, of which 222,000 bales were foreign, there is every reason to believe that the total consumption of all kinds in the United States this season will be about 7,500,000 bales, of which about 250,000 will be foreign. In other words indications are that American mills will consume about 1,500,000 bales more this season than they consumed last season, which was the previous record. This is a remarkable showing, denoting the unlimited possibilities of the cotton manufacturing industry in America. The indicated year's increase in consumption in the United States alone promises to equal the combined consumption of American cotton by Japan, Italy and Spain during a normal season.

During the month of February, American spinners stocks increased 10,000 bales vs an increase of 138,000 during February of last year, now figuring 1,985,000 against 1,654,000 one year ago, and stocks in public storage and compresses during February decreased 575,000 vs a decrease of 590,000 one year ago, now amounting to 3,971,000 vs 4,075,000 one year ago.

Exports of Europe continue comparatively light compared with shipments of last season, since August 1st, 3,738,000 against 5,957,000 to even date one year ago, but the foreign demand will likely continue throughout the whole season, whereas it slowed up after March of last year.

To March 10th, spinners of the world took 9,270,000 bales of American cotton compared with 8,213,000 to even date one year ago, or 1,057,000 more, and as the total for the whole of last season was 13,819,000 bales, the world's takings are running on a basis of 14,876,000 bales for the whole of this season, which figures, however, remain subject to weekly variations during the remainder of the season.

A noteworthy feature of the statistical position of the staple is located in that fact that all of last year's surplus

seemed somewhat uncertain. About the middle of the month a change of importance was noted when print cloths grew stronger and added demands came upon the mills for goods to be made for shipment in the last half of this year. To a partial extent this business was regarded as somewhat speculative but the feeling prevails that cotton cannot be depressed much below its present level this year and in the event of a cessation of European hostilities it is fully expected that cotton will sell at very much higher figures. Staple cotton goods are the cheapest textiles in the market today, and it has been history that the best demand for cotton staples begins after the first flurry of high prosperity has passed and high prices in all other lines make consumers turn to the serviceable and relatively cheap cotton goods.

It is regarded as particularly significant that such staples as percales, shirting chambrays, ginghams, and prints, have sold very well at advancing prices and they have been going into consumption so far as retail purchases are concerned. The fall output of the largest producers of these goods has been placed under order and the goods have been withdrawn from the market. Bleached goods have been produced in larger quantities in the past six months than ever before and they have been distributed and called for in larger quantities. The situation in the markets at the present time promise a continuation of the great demand from staple and fine bleached goods.

The staple gingham markets are very strong, buyers being quite willing to pay the high prices that are prevailing, and based on 7½ cents a yard for Lancasters and Amoskeags. The lower priced lines of dress ginghams are also sold up closely and some cutters have been willing to pay better prices for seconds than they paid for firsts less than five months ago. Fine ginghams are scarce, partly because of color conditions, but more largely because of the abnormal demand for them which came in when plaids became fashionable for general wear.

The situation in fine and fancy goods is without parallel. The market demand is far in excess of the ability of mills to meet it. There is hardly a fine goods mill in the section that has not booked some goods for delivery through the balance of this year, and on many goods, some of a staple character, the earliest deliveries on new orders that can be arranged is September 1. The prices that have been paid to some New Bedford mills for fine yarn goods are the highest ever touched, the boom period of 1907 being no exception. Such staples as fine nainsooks, lawns, cambric muslins, longcloths and india linens, have commanded premiums for spot shipments. Anything in the way of a high novelty, whether in the form of a voile, marquisette or fancy stripe, will bring the mills' asking price if anything like an early delivery can be assured. Numbers of converters are pressing for goods for the summer season to be delivered right up to the end of August.

The dye troubles are numerous but not wholly insuperable. Converters are not able in many instances to receive assurances from finishers as to the colors sought or the patterns desired, yet they manage in one way or another to conform their requirements to what manufacturers can produce. It is a frequent thing to hear manufacturers state that if converters could arrange finishing plans to their liking the worst sort of a runaway market would ensue.

There is hardly an idle plant in this section, and where there is idle machinery it is not due to a lack of orders or an opportunity to get them. There is some overtime work going on but no all night operations are countenanced. Many of the fine goods mills are unable to keep yarns supplied to the looms and they are operating carding or spinning departments overtime. Some of the printing and finishing companies, and several of the bleacheries are forced to keep night forces at work in order to keep the huge output balanced. But in these instances only a very limited part of the plants are being worked and it is doubtful if help could be secured for any sustained night operations.

While fine goods mills are making a great deal of money and have a great deal of business booked, there are many other concerns that are exceedingly busy and are laying by good profits to be used against the reaction that is expected to set in violently some time in the future. The yarn mills are running in full, some of them engaged on the finer numbers having all the business they will take for this year. This is especially true of mills making combed yarns. Some of the quilt and damask mills have never been busier. Mills making crashes and towellings are exceedingly busy and at the most profitable prices they have recorded in years. The napped goods mills were fearful of a light business because of the scarcity of dyes, which are sopped up freely in loosely spun yarn fabrics. But it has developed that the Tremont & Suffolk mills have all the orders they can take care of, the Nashua blanket lines are off the market for the balance of this year, and the big Amoskeag lines are fully under order as far ahead as orders will be accepted.

The intense activity in machinery concerns has no parallel in American history. It was stated a few days ago by one of the largest factors in a great machinery concern, that his plant alone could book orders for 1917 for 350,000 spindles if it cared to accept the business. To be sold up a year ahead has not been an uncommon experience for some mill machine shops, but to have actual orders on the books for that time, and be offered beside cash orders for machines not to be delivered in two years is quite out of the ordinary. Nearly all the shops are behind on orders owing to the constant pressure from customers whose needs must be met even if new work waits. One concern is engaged to deliver a mill equipment in July and cannot possibly complete it before October unless something unforeseen occurs to speed up the workers. The situation in the machine shops is a particularly delicate one in the matter of help for the reason that the drain from ammunition factories is constant and the restlessness of machinists is being stimulated by all sorts of agitation.

The Yarn Market.

The yarn situation continues very much along the lines of last month and the market is still a spinners' market. The early weeks of the month found 2-ply fine combed lisle and mercerized yarns in good demand for prompt and nearby deliveries. Prices of carded knitting yarns were a little softer as knitters were not buying freely of these qualities. Spinners of weaving yarns were very firm in their quotations during this period, but weavers were not disposed to buy freely.

The combed yarn situation practically saved the day, as demand was brisk and prices well toward the top. The demand for combed Sea Island was good and prices were

strong. Sales of 40's 2-ply on skeins were made at 66 and 67 cents; 50's 2-ply on skeins 73 cents; 60's 2-ply on skeins 75 cents; 80's 2-ply on skeins 92 to 94 cents. A sale of 40's 3-ply combed peeler skeins was made at 48 cents. There was considerable talk of substituting carded yarns for combed yarns, and two or three hosiery manufacturers were reported to be using carded mercerized yarns, but the demand for combed yarns still continued and prices mounted higher as the time passed on.

Later in the month the prices on combed yarns increased and there continues to be a good demand for small quantities of 50's 2-ply to 80's 2-ply combed lisle and mercerized yarns. The carded yarn situation, however, is not as satisfactory as is the case with combed yarns. The demand has not been up to the spinners' expectations and the prices occasionally sagged. Some spinners have accepted contracts on the basis of 19 cents for 10's carded cones, while others are quoting 21 to 21 1-2 cents basis of 10's for ordinary quality. High grade carded yarns that make a fair substitute for combed yarns are in good demand, and spinners handling these yarns are reported to be fairly well sold up. The weaving lines continue active with a better demand for yarns especially in coarse numbers.

Following are recent quotations in the Philadelphia market:

Southern Single Skeins.

8s	18½ @19	10s	19 @19½
14s	20½ @21	16s	21½ @22
20s	22 @22½	24s	24
26s	24 @24½	30s	28½

Southern Single Warps.

8s	18½ @19	10s	19½ @20
12s	20½	14s	20½ @21
16s	21½	20s	22
24s	24 @24½	26s	25 @25½
30s	28½ @29	40s	36 @37

Carpet and Upholstery Yarns in Skeins.

8-4 slack	18½ @20	9-4 slack	20 @20½
8-3-4 hard twist	18½ @19		

Southern Two-Ply Skeins.

8s	20 @20½	10s	21
12s	21	14s	20½ @21½
16s	21 @22½	20s	23½
24s	26½ @27	26s	27½ @28
30s	29½ @30	40s	37 @38½
50s	49 @50		

Southern Two-Ply Warps.

8s	20 @½	10s	21
12s	21½	14s	22 @22½
16s	23	20s	24 @24½
24s	26½ @27	26s	27½ @28
30s	29½ @30	40s	38 @39
50s	49 @50		

Northern Two-Ply Carded Peeler Skeins.

20s	27½ @28	24s	29 @29½
26s	29½ @30	30s	32 @33
36s	36 37	40s	42 @44
50s	50 @52		

Two-Ply Combed Peeler Skeins.

20s	32 @33	24s	34 @36
30s	39 @42	40s	47 @49
50s	57 @59	60s	66 @67
70s	73 @76	80s	80 @84

Southern Frame Spun Yarn on Cones.

8s	19 @19½	10s	19½ @20
12s	20 @20½	14s	20½ @21
16s	21 @21½	18s	21½ @22
20s	22 @22½	22s	22 @22½
24s	23 @23½	26s	23½ @24½
30s	25½ @26		

Northern Mule Spun Carded Yarn on Cones.

10s	22 @22½	12s	22½ @23
14s	23 @23½	16s	23½ @24
18s	24 @24½	20s	24½ @25
24s	25½ @26	26s	26 @26½
30s	27½ @29	40s	37 @38

Northern Mule Spun Combed Peeler Yarn on Cones.

10s	29 @29½	12s	29½ @30
14s	30 @30½	16s	30½ @31
18s	31 @31½	20s	32 @32½
22s	32½ @33	24s	33 @33½
26s	33½ @34	30s	37 @38
36s	40 @41	40s	45 @46

Cotton Comment.

BY H. AND B. BEER.

New Orleans, Mar. 15th., 1916.

The technical position of market having been made stronger by reason of the heavy liquidation attending the maturity of March contracts last month, values have advanced about $4 per bale since our last review.

Except for the uneasiness in connection with recent developments in Mexico, the international political situation is more favorable, as Germany and Austria have been impressed with the fact that Congress and the American people are supporting President Wilson in his foreign policy.

There developed a better trade demand on the late decline which has continued to the present moment, Russia, Japan and American mills being the principal buyers.

The manner in which the consumption of cotton is increasing in the United States is a revelation. According to the report of the U. S. Census Bureau, issued to-day, American mills consumed 639,000 bales in February vs 493,000 in February of last year, making the total for the seven months ending with the close of February 4,167,000 bales against 3,244,000 for the corresponding time last season.

As the increase in the consumption of cotton in America from August 1st. last to the close of February was 923,000 bales larger than for the corresponding period last season, when the total for the whole season was 6,009,000 bales, of which 222,000 bales were foreign, there is every reason to believe that the total consumption of all kinds in the United States this season will be about 7,500,000 bales, of which about 250,000 will be foreign. In other words indications are that American mills will consume about 1,500,000 bales more this season than they consumed last season, which was the previous record. This is a remarkable showing, denoting the unlimited possibilities of the cotton manufacturing industry in America. The indicated year's increase in consumption in the United States alone promises to equal the combined consumption of American cotton by Japan, Italy and Spain during a normal season.

During the month of February, American spinners stocks increased 10,000 bales vs an increase of 138,000 during February of last year, now figuring 1,985,000 against 1,654,000 one year ago, and stocks in public storage and compresses during February decreased 575,000 vs a decrease of 590,000 one year ago, now amounting to 3,971,000 vs 4,075,000 one year ago.

Exports of Europe continue comparatively light compared with shipments of last season, since August 1st, 3,738,000 against 5,957,000 to even date one year ago, but the foreign demand will likely continue throughout the whole season, whereas it slowed up after March of last year.

To March 10th, spinners of the world took 9,270,000 bales of American cotton compared with 8,213,000 to even date one year ago, or 1,057,000 more, and as the total for the whole of last season was 13,819,000 bales, the world's takings are running on a basis of 14,876,000 bales for the whole of this season, which figures, however, remain subject to weekly variations during the remainder of the season.

A noteworthy feature of the statistical position of the staple is located in that fact that all of last year's surplus

of nearly 2,000,000 bales from the big crop of 1914 has disappeared, as the world's visible supply of American cotton is now nearly 2,000,000 bales smaller than it was at this time last year—4,062,000 vs 6,030,000.

It is evident, therefore, as indicated by the large takings by the world, that the world's consumption of American cotton will be at least 14,000,000 bales this season, which will absorb all of last year's crop of about 12,000,000 and the 2,000,000 surplus from the 1914 crop, leaving the trade, at the close of this season, depending altogether on the new crop for next season's supply of raw cotton.

Preparations for the new crop in the southwest are being delayed by a protracted drouth in Texas and Oklahoma, and only fair progress is reported in the Mississippi valley and south Atlantic states with no indication of a material increase in the acreage this year.

COTTON MANUFACTURING.

Flyer-Lead Vs. Bobbin-Lead.

BY WILLIAM SHAW.

The most important change which was made in fly frames was in making the bobbin lead the flyer instead of the flyer leading the bobbin.

A rotary motion can be given to both flyer and bobbin, so that one may lead the other, all that is necessary to do this is to change the direction of the sun-wheel and change the position of the presser rod attached to the hollow leg of the flyer.

We first had the flyer-lead frame, and in this case the flyer moved faster than the bobbin, or ahead of it. Many were dissatisfied with such an arrangement, their chief claim being the same that is made today against the flyer-lead system, that owing to the flyer starting in advance of the bobbin a weak place was made in the roving.

In order to remedy this defect, or what was believed at that time to be a defect, the system was altered and the bobbin made to lead.

The idea was that the flyer would still start first and only cause a little slack, which would soon be taken up and do no harm.

This subject is regarded by the writer as the most important in cotton manufacturing, and if the reader will closely follow this article, I think he will admit that the change was a mistake.

I will try to point out the merits of the two systems and then the reader can form his own conclusions.

In a flyer-lead frame, since the flyer rotates at a speed greater than that of the bobbin, the latter must have its slowest speed when empty and its greatest speed when filled; also it must constantly and uniformly increase in the number of revolutions per minute betwen these two extremes. This is the next objection to a flyer-lead frame, the larger and heavier the bobbins become the faster they must be driven.

Another reason is that it was, of course, necessary to fix and balance defective flyers in those days as now, and the flyer being repaired and balanced was placed on a spare spindle, made to rotate by being given a quick turn by the palms of the hands, and when in operation the forefinger of one hand was held between the paddle and the spindle to ascertain if the presser rod was free to respond to the speed given to the spindle, or in other words, the presser rod attached to the hollow leg of the flyer not being allowed to follow a straight line would cause the pad to hug the spindle. It is said that very often many would turn the spindle in the opposite direction, and by doing so, it was discovered that the paddle hugged the spindle more by having the paddle lead the flyer. This discovery led to the belief that having the paddle lead the flyer would cause more pressure between the paddle and the surface of the bobbin, and that more roving could be added, which, of course, was found to be true with the aid of the grip found on the termination of the pad.

It was also pointed out that with such a system the same amount of roving could be added to a bobbin of a much narrower gauge, thus saving power in having a lighter flyer and also saving floor space. Hence, it is claimed, that the bobbin was made to lead in order to construct the flyer so the paddle would lead the flyer. Whether this reason is the correct one I do not know, but it does seem that there is a great deal of weight to it, and the advantages derived were still greater than the first two reasons. In fact, these advantages were accepted for years, and it was not until recently that they were rejected by a few thoughtful carders, who discovered that the strand was strained and made uneven by the change, which, at the present time, is known and called "uneven conditions on fly frames."

I think I have said all that can be said against the flyer-lead frame. I will try to explain the merits of the two systems from the bottom cone to the bobbins.

On any up-to-date flyer-lead fly frame equipped with the Oldsworth compound, we find the cone belt on the small end of the bottom cone and on the large end of the top cone at the start of a set, the same as on a bobbin-lead frame. The cone belt is moved laterally toward the large end of the bottom cone, which diminishes the speed of the bottom cone, also the same as on the bobbin-lead frame. This is what seems to puzzle most students. By following the bottom cone and its connections to the compound, we find, in the case of the flyer-lead, the bottom cone drives the sun-gear in the same direction of the driving shaft.

One not acquainted with mechanics may be surprised that the sun-gear causes the differential sleeve to be accelerated two revolutions for each revolution that the sun-gear makes. Since, however, this is a well known fact, I give no mathematical proof, but if the privilege of experimenting with a compound in a mill can be obtained, it can be easily demonstrated by turning the sun-gear while the driving shaft is stopped that the sleeve will make two revolutions for every revolution of the sun-gear.

Let us stop here and study how, for every single revolution of the sun-gear in case of the flyer-lead frame, two

revolutions are taken from the driving shaft. The only difference in the gearing between the two systems is the position of the compound pinion, that is, it is placed on the opposite side of the sun-gear. Therefore, with the compound pinion placed on one side, we drive the sun-gear in the *opposite direction* to that of the driving shaft and two revolutions *are added* in case the bobbin-lead frame, while on the other hand, when the compound pinion is placed on the other side, the sun-gear is driven in the *same direction* as that of the driving shaft and for every revolution of the sun-gear two revolutions *are lost*.

Now, let us study what effect the direction in which the sun-gear is driven has on the winding-on. The front rolls always deliver a uniform length of roving in any given length of time, and for the purpose of illustration it may be assumed in this case that the length delivered in a given period of time is ten inches. Then, in order to wind this length of roving onto the bobbin in a flyer-lead frame, the eye of the presser pad must move ten inches farther than a point on the surface of the bobbin during the length of time that it takes for the drawing roll to deliver ten inches of roving. In the bobbin-lead frame, a point on the surface of the bobbin must move just ten inches farther than the eye of the flyer presser pad during the length of time that it takes for the front rolls to deliver ten inches of roving. The gain, or lead, of the flyer over the bobbin, or of the bobbin over the flyer is independent of the actual velocities of the bobbin and flyer, because both are rapidly revolving in the same direction.

From what has been said, it should now be plain that the sun-gear is driven in the same direction as that of the driving shaft to retard the bobbin and wind on the length of roving delivered by the front rolls.

It should also be seen that the faster the bottom cone is made to revolve the more revolutions are taken from the bobbins, and, as the flyer speed is constant, more winding takes place. At this point let us consider one claim against the flyer-lead frame, which is, that owing to the flyer starting in advance of the bobbin a weak place was made in the roving. The reader can now see that there is no truth in such a statement, although it has caused many to change the system.

A little reasoning in old days would have shown that if the bottom cone started in advance of the flyer a weak place would be made in the roving. To prove this let us assume that the flyer starts in advance of the bobbin and in starting, the cone belt fails to move the bottom cone, the bobbin then would rotate at the same speed as the flyer and no winding-on would take place. This fact is proven also that we must raise the bottom cone at doffing time to increase the speed of the bobbins to that of the flyers so as to run the ends over the top of the flyers.

There is only one way in which the roving can be strained on the flyer-lead frame as claimed, and that is by the bottom cone starting ahead of the flyer and this is an impossibility. In the flyer-lead frame any hesitation of the bottom cone will cause a *slack tension* as any hesitation of the bottom cone *increases* the speed of *the bobbin*, and when we increase the speed of the bobbin to that of the flyer no winding-on can take place, nor can the work be strained.

Now let us study the bottom-lead frame, taking what has already been said of the flyer-lead frame into consideration. The sun-gear is driven in *the opposite* direction to that of the driving shaft to increase the speed of the bobbin over the flyer and wind-on the length of roving delivered by the front rolls. The faster the bottom cone is made to revolve the more revolutions are added to the bobbins. The flyer speed is constant and the faster the bottom cone revolves the faster the bobbins revolve over the speed of the flyer. Therefore, in the case of the bobbin-lead frame, when we raise the bottom cone at doffing time, the bobbin speed is *decreased* to the same speed as that of the flyers, and in case the flyer-lead when we raise the bottom cone at doffing time, the bobbin speed is *increased* to the same speed as that of the flyers.

There is a slight difference in the outline of the cones between the two systems. In the case of the flyer-lead frame the cones are modified to suit two wraps of the roving around the presser finger, while in the case of the bobbin-lead frame the cones are constructed to suit three wraps of the roving around the presser finger.

I want to call attention here to what is said regarding back lash in the case of the flyer-lead frame, as many writers seem to dwell on this point. If there is no difference in the gearing how can there be more back lash when only the pinion is changed from one side of the sun-gear to the other? Granted that there is back lash, is not this more of a help in case of the flyer-lead frame than in the bobbin-lead frame? If the bottom cone fails to act, the bobbin and flyer rotate at the same speed. On the other hand, if there is back lash, in the case of the bobbin-lead a certain amount of stretch will surely take place. The reason for this is that at all times the bobbin leads the flyer and any hesitation of the flyer will cause a weak place.

This can best be proven by making the following test on an old bobbin-lead frame. Make a mark on a full bobbin where the eye of the pad stands, and next move the flyer on the spindle as far as possible and make another mark. Next measure the distance and the amount of play found. Will not this question then suggest itself; as the bobbin leads the flyer at all times, will not this play in the slot of the flyer cause a weak place in the roving?

We have the same play on any old *flyer-lead* frame, but enough has been said so that it is evident that any hesitation of the flyer will cause a *little slack*, as the flyer leads and must be in advance of the action of the bobbin to cause a weak place, which as I have stated, is an impossibility.

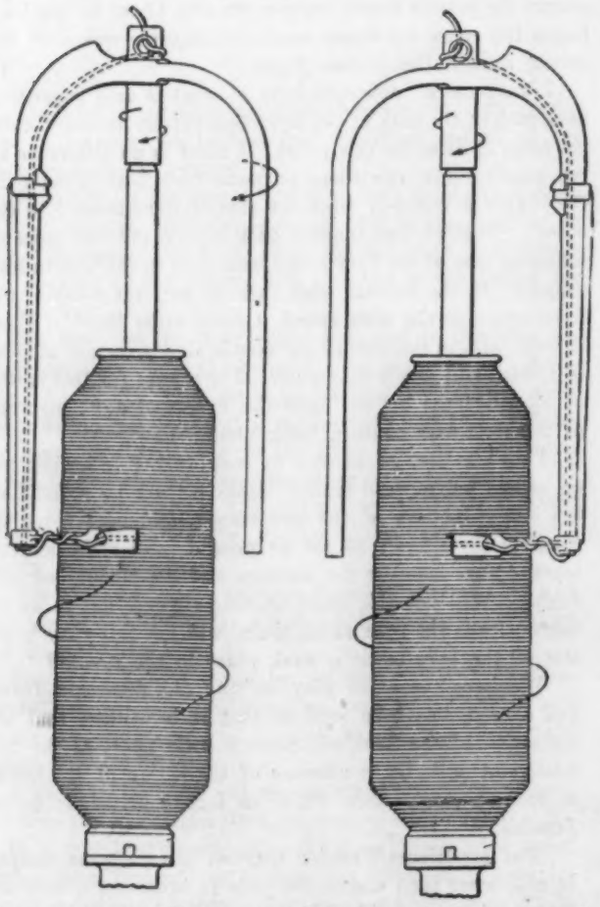
The experienced reader may at his stage be tempted to ask, what then causes the ends to break on a flyer-lead frame when started? What causes a weak place in the roving? My answer is dry and dirty front rolls.

What is said here can easily be tried by all readers in charge of flyer-lead frames. When we start a flyer-lead frame, and the ends snap here and there, stop it immediately, lift all the front saddles from the front rolls, clean the saddles and put a drop of oil on every roll, and the frame will start. We cannot neglect the front rolls in the case of the flyer-lead frame, and I am now going to prove this.

By referring to Figs. 1 and 2 we see that the presser rods of both systems have the same opportunity to swing and respond to the speed of the flyer. However, by closely studying Fig. 1, it will be noticed that the point of the pad leaves the bobbin, while in Fig. 2, the pad points in the direction in which the bobbin and flyer rotate. It should

be understood here that the surface of the bobbin in figure two has a greater speed at all times than that of the flyer except at doffing time.

It should also be understood that when both are revolving at the same speed, the same pressure between the pad and the surface of the bobbin is attained. But owing to the point of the pad in figure one leaving the surface of the bobbin, the grip on the strand is not as firm as that in figure two. For this reason, the tension comes between the pad and the front rolls, while in figure two, the tension is mostly between the pad and the surface of the bobbin. This latter, to my mind, is the strongest point in favor of the bobbin-lead frame as more roving can be wound on the bobbin. Besides, having the tension between the pad and the surface of the bobbin is a condition that should exist on all fly frames.



ON THE LEFT FIG. 1 SHOWS THE RELATIVE POSITION OF THE FLYER, BOBBIN AND ROVING IN A FLYER-LEAD FRAME.

ON THE RIGHT, FIG. 2 SHOWS THESE SAME RELATIVE POSITIONS ON THE BOBBIN-LEAD FRAME.

This grip on the termination of the presser pad in Fig. 2, helps to hold the twist in the strand which is another strong point in favor the bobbin-lead frame. We never get the exact figured twist for the reason that a certain amount is lost at the termination of the presser pad. Therefore, we lose more twist in the case of the flyer-lead frame which means a loss of production. However, the grip found at the termination of the presser pad is not desired at present by many carders, for the reason that this grip on the strand calls for a different cone for different stock, hank and types of flyers. Again, flyers out of balance and not free to respond to the speed of the flyer, bother the speeder tender. Fluffy cotton will bother more, for the reason that the cotton being of a spongy nature, will offer more resistance to the pressure of the pad and grip, with the result that we will have bobbins of a different diameter at doffing time. In fact,, in many mills, in case of fluffy cotton, the frames are often doffed before the set is filled.

To my mind, the strongest point against the grip found at the termination of the pad is the fact that a speeder tender can neglect the drawing rolls without having much trouble. The fact can be proven by finding bobbins as hard as a rock many times, but we never find such bobbins on a flyer-lead frame. When the tension comes between the pad and front rolls, the least pull from a dry or dirty roll will surely break the end. When the tension is between the pad and the surface of the bobbin, the strand will stand a great amount of tension before breaking for the reason that the pull and grip combined reduces the diameter of the bobbin which makes it very hard.

I have stated that to my mind the change in system was a mistake, and I am now going to compare the advantages and disadvantages of both.

The chief claim against the flyer-lead is the weak place made by the flyer starting in advance of the bobbin, which is an impossibility. The next claim is that the bobbin must have its slower speed when empty and its greatest speed when filled. There is very little weight to this claim. In the flyer-lead frame the bobbin speed is at all times *less* than the flyer speed except at doffing time, while in the bobbin-lead frame the bobbin speed is at all times *greater* than the speed of the flyer except at doffing time. Therefore, at no stage does the flyer-lead bobbin travel as fast as that of the bobbin-lead.

Notice how much more fly is found on the flyers at doffing time in case the bobbin lead. Owing to the bobbin traveling at a greater speed than the flyer, much loose fly escapes from the surface of the bobbin. The same occurs with the flyer-lead, but the amount of fly is not as great, for the reason that the bobbin rotates at a slower speed than that of the flyer.

The most mistaken claim is that of more power to drive the frame owing to the bobbins being driven faster when the set is filled. It takes very little reasoning to convince anyone that it requires less power to drive a frame when the sun-gear is driven in the same direction as that of the driving shaft. It will be remembered that when the change was made, the chief objection was the friction between the differential sleeve and the driving shaft. If the shaft made 450 revolutions per minute, the differential sleeve made 450 revolutions in the opposite direction, or equal to 900 revolutions between the two revolving surfaces, which caused much friction.

Is it not a fact, that, since the change was made, inventors began to get busy, resulting in many new compounds? However, at the present time, all of the latest fly frames are equipped with the old motion, with a sleeve between the differential sleeve and the driving shaft to destroy the friction.

What has the change done? We are unable to build a frame today to suit all stocks, hanks and flyers, and the grip found on the termination of the presser pad is responsible.

The English builder across the water still clings to the

bobbin-lead frame, but we must travel much before we will find an "overlooker" in favor the bobbin-lead frame. I speak from experience, I am not alone in this contention, as some of the best and brightest mill engineers on this side and across the water agree with me.

In my article on "Making Yarn Strong and Uniform," which appeared in Cotton for May, 1913, I stated, "if the reader has the opportunity to make any test on a fly frame, let him stop the frame, and then lift a bobbin gear slightly and turn it about one-half turn towards the presser finger, or, in other words, turn the bobbin gear so as to cause a certain amount of slack on the end in question. Next, start the frame again, and watch and see how this slack is taken up immediately. Why should this slack be taken up so soon if the relationship of the surface speed of the front roll and bobbin be equal? Does this excess surface speed of the bobbin, that takes this slack up immediately, strain the roving and cause light yarn? Does this excess surface speed of the bobbin only take place when the frame is started or stopped?"

The grip at the termination of the presser pad is responsible, for the reason that when the frame is not up to speed the pressure between the pad and the surface of the bobbin is reduced, and then the tension comes between the pad and the front rolls. This is why on all bobbin-lead frames the slack is taken up immediately, the pressure and grip of the pad, changes the tension on all the ends when the speed of the frame is decreased.

Make the same test on any flyer-lead frame and we will find that it will take a much longer time for the slack to be taken up. This point alone is enough to brand the change in system a mistake, as it has been proven beyond a doubt, that these two tensions found on all bobbin-lead frames are responsible to a large degree for weak yarn and uneven sizing of the yarn.

As I have previously stated, the bobbin-lead is best suited for fine work where the best of stock is run. The reason for this is that the strand of cotton and stock aided by the grip at the termination of the pad, is strong enough to hold the diameter of the bobbin at all times to suit the outline of the cones at every stage during the building of the set, or in other words, the strand is strong enough to prevent the diameter of the bobbin increasing to a point where it will destroy the relationship of the surface speed of the front roll and bobbin.

In closing I wish to state that I do not believe it is possible to find one carder that is in charge of both bobbin-lead and flyer-lead frames who will not bear me out in saying that a flyer-lead frame can run a much lower grade of stock than a bobbin-lead frame, which goes to show that the pressure found between the pad and the bobbin on all bobbin-lead frames is one of the greatest evils that confronts the manufacturer at the present time. I believe it is safe to predict that we will slowly but surely drift back to the flyer-lead frame to run coarse work and low stock.

The Advertising Contest.

The contest announcement is repeated in this issue and contest letters are eligible in this competition if received before or on May 15, 1916.

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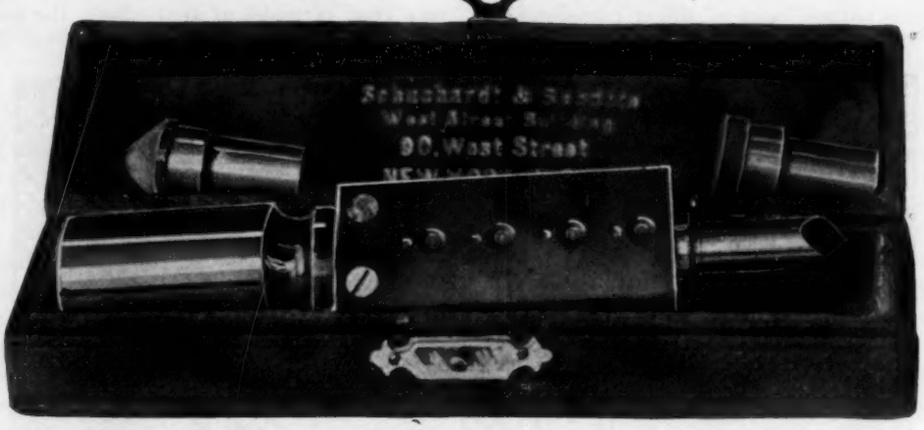


Our Service Department desires the opinions of active mill men on the quality of the work shown in the advertising pages of this issue of COTTON.

We are, therefore, going to give this indicator for the best letter by a mill executive who gives the clearest and most definite reasons why, and in what manner, any certain advertisement is, in his opinion, the best.

Contestants must be mill executives, from overseers to presidents, connected with spinning, weaving, knitting, or finishing plants. The letter must be accompanied by the name, address and official position of the writer in order to be eligible.

The judges will be the Editor of COTTON and the Manager of the Service Department, whose decision will be final.

Address Contest Department of COTTON, Atlanta, Georgia.

Designs for Fancy Cotton Fabrics.

BY THOMAS WOODHOUSE AND JAMES IRELAND.

PART TWENTY-EIGHT.

We have already had occasion to illustrate a few cloths in which the honeycomb weave played a most important part. The application of this elegant weave in designs for cotton fabrics which have to undergo little finishing is one which many designers foster. Another

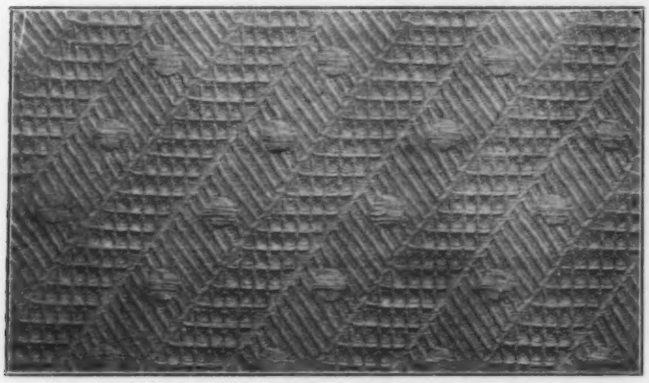


FIG. 123

excellent example of such a fabric is illustrated in Fig. 123. In this example both warp and filling are ivory or pale cream, and the finished cloth contains 104 threads per inch and 80 picks per inch. The pattern consists of alternate broad diagonal bands each alternate band being developed in the 8-thread honeycomb weave. The remaining alternate bands are developed by the 5:1:1:1 twill to left and upon which appears large circular spots of filling about half an inch apart. Between each pair of distinct bands is a narrow band of filling introduced to separate and to emphasize each band.

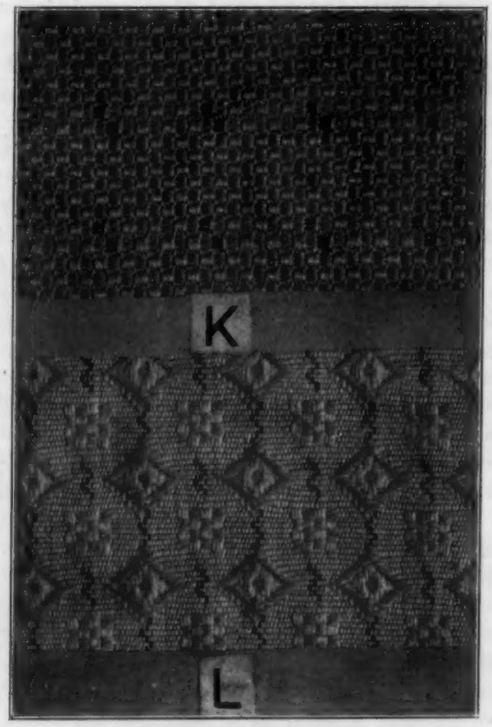


FIG. 125

The design in Fig 124 shows one repeat or unit of the pattern, and it occupies 144 threads and 144 picks. In all cases the honeycomb weave suggests a bulky appearance to the fabric, an effect which is probably due to the undulating surface in both directions in such fabrics. It will of course be understood that a jacquard machine will be essential for the production of this fabric.

The two cloths illustrated at K and L, Fig. 125 are very good examples of spot effects, the spots in K being obtained by extra filling picks, while the zig-zag spots in

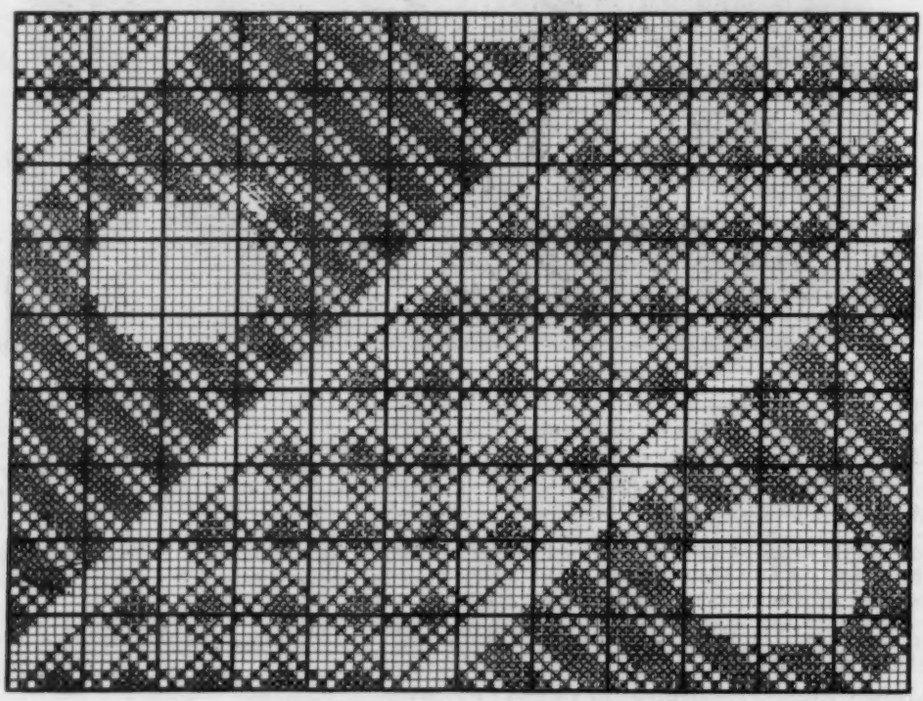


FIG. 124

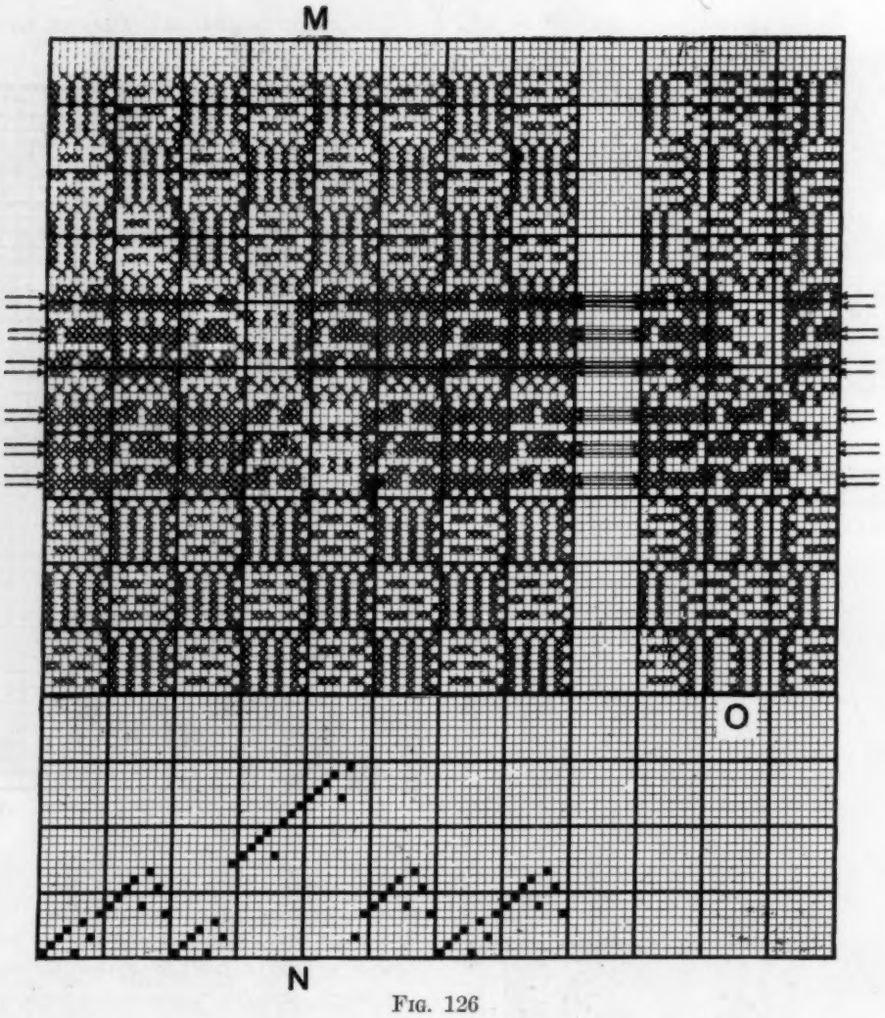


Fig. 126

L are the result of extra warp threads. The warp and filling yarns for the effective ground effect in pattern K are of a very elegant pale greenish cream color, while the spot yarn is eau-de-nil. The cloth contains 112 threads per inch and 112 ground picks of filling. The ground weave is of a rather complicated rib weave, and, curiously enough, the ribs are developed alternately in warp and in filling. Both sets of ribs stand out prominently, and, in addition, the peculiar structure gives to the ground a sort of "spider" pattern. This is because the large number of threads and picks are in the same horizontal line being forced together to form the nearest approach to a "double maximum" cloth, if we may be allowed to use such an expression, hence the outside threads and picks in each group of 8 are deflected from the true vertical and horizontal lines—the deflected warp threads only showing on the surface of the cloth.

The grunnd weave is complete on 16 threads and 16 picks, but the introduction of the small spots, even in square order as shown, necessitates an increase in the design to 64 threads and 76 picks. The unit design is illustrated at M, Fig. 126. The extra figuring picks for the spots are indicated by the arrows at both sides of the design. The long floats of 7 blank squares on these picks represent where these filling picks are on the surface for forming the spots, while the single blank squares on the same picks show where the picks are stitched to the body of the fabric. The long floats of crosses indicate that the figuring picks float under 15 threads when on the back of the fabric. It will be understood that where the figuring filling passes over a thread for the purpose of stitching, that place is chosen so that the spotting filling will not show on the surface of the texture.

The lowest possible number of harnesses required to weave this cloth is 24. The draft for this number is shown at N, and the weaving plan at O. The draft is a very irregular one, and for the sake of preventing mistakes due to the weaver taking up threads on the wrong harness, it would be advisable, if this draft were adopted, to have the harness knitted to order and to the draft, and thus facilitate the work of the weaver and reduce the chance of faulty drafts to a minimum.

The cloth at L, Fig. 125, has a rib or repp ground upon which is displayed alternate diamond and square patterns developed by floating threads and picks, in addition to the small zig-zag effects produced by the extra warp threads. In the finished state the cloth contains 96 ground threads per inch plus the extra figuring threads, and 64 picks per inch. The unit pattern is complete on 72 threads and 40 picks; 60 of these threads are for the ground and 12 for the extra figuring as illustrated at P, Fig. 127. The outline of the diamond pattern as well as the central spot of the same is developed by the filling, whereas the square pattern is developed both by warp

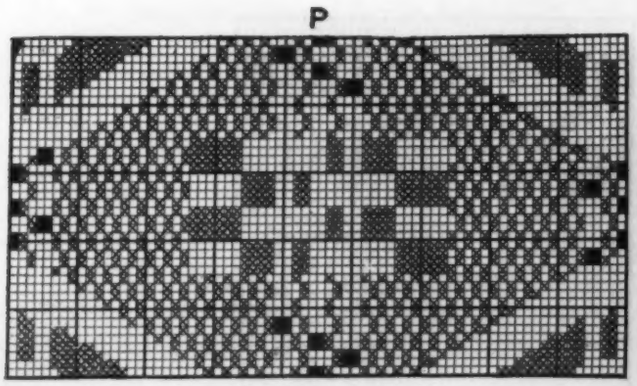


FIG. 127

and filling in a modified basket weave. The extra black figuring threads appear on the surface between each pair of diamond patterns, and also between each pair of square patterns. The actual basket pattern contains 6 threads in each group and weaving 4/4. This weave appears in or near the center of the design P, but is broken up by the introduction of the 6 extra figuring threads which are shown in solid black. It will be observed that there are two sets of figuring threads—each set comprising 6 threads which weave in pairs. There are so few threads that weave in the same order that it is scarcely advisable to adopt a draft. The pattern or cloth would probably be woven with the aid of a jacquard. The remarks about the sizes of machines will also apply in this instance.

The cloth illustrated in Fig. 128 would appear at first sight to be woven with a simple basket weave, but a closer

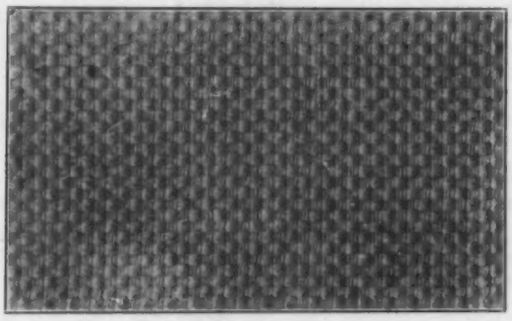


FIG. 128

examination shows that although the structure has some distinct resemblance to a weave of this kind it is nevertheless much more elaborate. Both warp and filling are white, and the finished fabric contains 192 threads per inch and at least 300 picks of filling per inch. One unit of the design is illustrated at Q, Fig. 129, and from this unit it will be clearly seen that the resulting cloth will have a dice or basket effect, warp and filling alternating in both directions. The number of threads in each dice or square is 12, although practically only 6 are seen on the surface of the cloth. In the warp dices, these threads which show on the surface are marked solid. They float alternately over and under 18 picks, thus forming a similar warp dice on both sides of the fabric. As a matter of fact the cloth is purely a reversible one as will be gathered from the design. The remaining 6 threads of the warp dice float over five picks and under one for three times, while a similar arrangement obtains with regard to the filling dices.

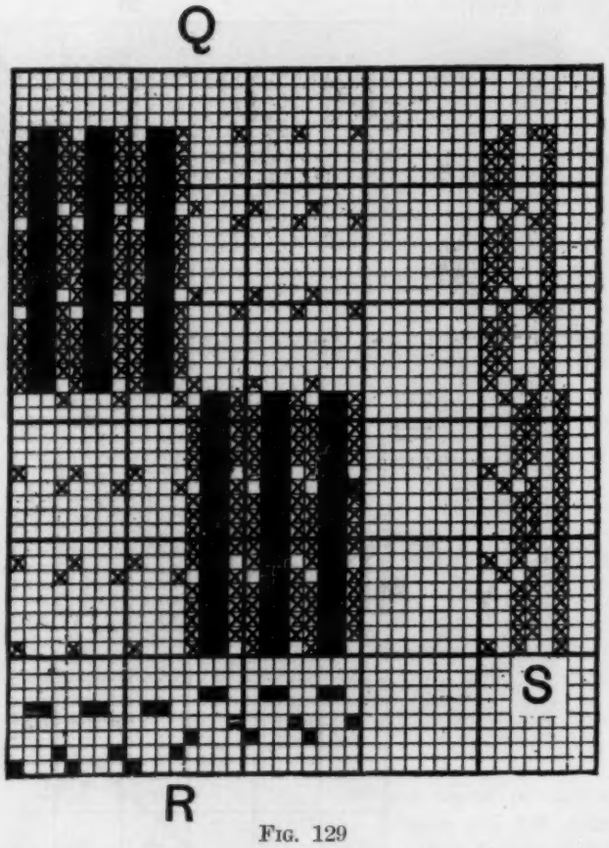


FIG. 129

Those threads which float over five picks are themselves covered by the longer floating threads, but the former help to make a firm fabric. Those threads which are marked in crosses occupy a position approximately in the center of the fabric, and are in consequence covered by the floating threads on both sides. Similar remarks apply to the floating picks, and in both cases the large number per inch aids considerably in hiding the stitching threads and picks. Six harnesses only are required for the production of this cloth as shown by the draft at R, and the weaving plan at S, Fig. 129. The structural effect makes the fabric very durable.

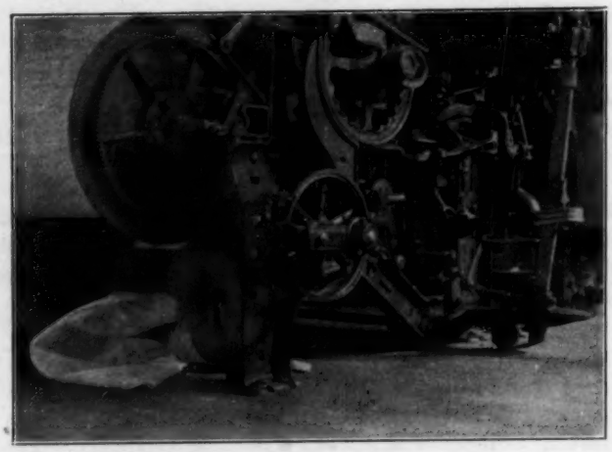
(To be continued.)

Shortage in Materials for Making Paper.

Something like 15,000 tons of different kinds of paper and paper-board ore manufactured every day in the United States and a large proportion of this after it has served its purpose could be used over again in some class of paper. A large part of it, however, is either burned or otherwise wasted. This, of course, has to be replaced by new materials. In the early history of the paper industry publicity was given to the importance of saving rags. It is of scarcely less importance now. The Department of Commerce is glad to bring this matter to the attention of the public at the suggesion of a large paper manufacturer in the hope that practical results may flow from it. A little attention to the saving of rags and old paper will mean genuine relief to our paper industry and a diminished drain upon our sources of supply for new materials. The Department of Commerce will be glad to put inquiriers in touch with the manufacturers who are interested.

An Improved Friction Let-Off For Looms.

The device illustrated herewith was invented by W. A. Black and A. P. Stevens, of Spartanburg, S. C., and is calculated to supplant the old style of friction let-off as well as many of the so-called automatic let-offs, because of its simplicity, economy of space and low cost of upkeep. The advantages of this invention will be at once apparent. It controls the speed of the warp beam by means of a friction pulley set-screwed to a shaft which



A View of the Device on a Loom.

contains the gear on one end that in turn holds back the warp beam by gearing into the teeth of the beam head.

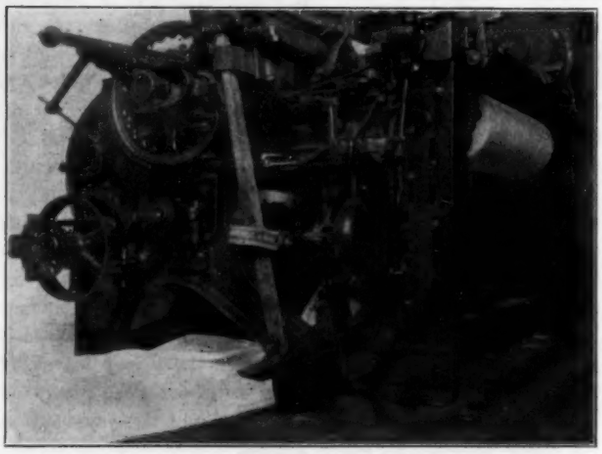
The friction is applied to this pulley by means of adjustable friction leather-lined steel bands, swinging by pins through a base block attached to the frame of the loom. The other end of the bands have attached gauge blocks, the lower blocks being concaved for an adjusting nut, through which passes an adjusting bolt to the top of the top band, where it is attached to a quick adjusting handle which has a cam throw or release of one inch with a coil spring between the guide blocks.

The inventors claim as advantages for this device that it will enable the manufacturers of cloth when changing from one class of goods to another that requires a friction let-off, to pull off the mechanical or automatic let-off and slip on this improved friction let-off with about the same amount of work that it takes to change a pick gear; no changing of beam heads are necessary; there are no ropes to stretch or take up; there are no levers swinging out into the alleys, and there are no weights to stumble over.

Another advantage claimed for this let-off, and this is considered one of the most important, is that loom manufacturers can build all their looms and cast all their beam heads alike, irrespective of the let-off required by the purchasers.

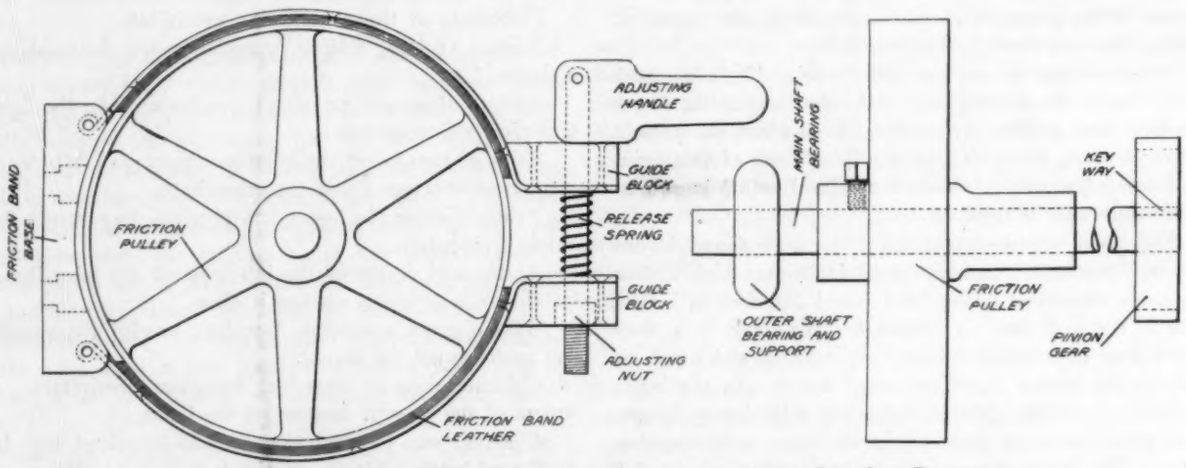
As will be seen from the illustrations, this let-off is simple and compact, and because of this fact the cost to manufacture and operate is decidedly in its favor.

This invention is the result of many years of experience on the part of the inventors and their endeavor to overcome the expense and defects of various let-off devices commonly used in the manufacture of heavy goods, and to establish a standard beam-head which could be used with



Another View of the Let-Off.

either a mechanical or friction style of let-off when manufacturing different grades of cloth. With this device, mills manufacturing different grades of goods of the same width may fill any available warp beam and thereby reduce the number of extra warp beams necessary to keep on hand, as is the case where different styles of heads are used, for each class of goods produced.



Sketch Showing Dimensions and Arrangement of Let-Off Device.

Dyeing, Bleaching and Finishing.

Quercitron Bark, Its Habitat and Uses as a Dyestuff.

BY WILLIAM B. NANSON.

Passing through the Piedmont Plateau, in the grand "Old North State," over ridges bisected by river valleys running in all directions, and further broken up into cross-ridges and forest covered heights mingled at times—among the foothills of the Blue Ridge—with low pointed peaks and more or less precipitous slopes and rocky cliffs; by field and woodland; by crystal springs of pellucid water bubbling up in bosky dells amid a riot of fern and brake, where, in the early spring, the dogwood displays its stars between the stems of the tall trees, at the time this was written feathered with the green and gold of a fast departing summer; and where the fringe tree rises like a fountain, and the hibiscus paints its green and gold setting with a scarlet splash of color; where the shining leaves of the yellow jasmine suggests a sweet reminder of a departed fragrance; by thickets where the Carolina pinkroot with its gorgeous red and yellow flowers gives promise of a coming harvest time; and where the ground is strewn with red and russet leaves. One travels through soft and sunshiny days of forest silence, the canopy above broken by a hurry of feathery clouds; the sky between them showing bluer than the blue. Through silent reaches of lush grasses and checkered shadows where the upper leaves of the tall sycamores tremble; even birds are silent, but the insect world fills with its light voice and drowsy rhythm the space between all other sounds.

In the cleared spaces, the haze of the afternoon, lying like a purple veil upon the foothills, make the fields of stacked corn seem like the silent and deserted encampments of a vanished army, russet and gray tents against a deep blue sky. Like a figured ribbon the sandy roadways unfold through a shadowy world of field and forest, hill and valley, and over many brown streams, while the wild flowers make the sward on either side look like sprinkled taffeta. Glorious old North Carolina is the meeting ground of the temperate and sub-tropical flora, the land of wild flowers, unrivalled by any state east of the Mississippi in the variety of its plant life, and surpassed by no region of similar area anywhere in the world.

Amid such scenes as these and towering like a monarch of the forest stands the Black Oak, the king of the North Carolina flora and the raw material from which our present article is made, for it is from the inner bark of this beautiful tree—*Quercus velutina*—that the dyestuff known as Quercitron Bark is produced.

The black oak is one of the finest trees found in our eastern forests, it is commonly 50 to 70 feet high and in favorable situations it has been found 160 feet in height, with a trunk 6 feet in diameter. The bark is a deep warm gray or sometimes nearly sepia, thick and rough on the outside, broken into thick short ridges. In the inside the color is orange. The branches are a light gray brown, stout and spreading, forming, in the open, a symmetrical figure. The leaves are a deep lustrous green above, dull whitish olive green beneath, the veins covered with fine hairs, they are deeply cut into about three lobes on either side, each terminating in three or more bristle tipped points.

The black oak is common on dry, gravelly upland and is found from southern Maine to northern Florida. In North Carolina it attains an average height of 85 feet, and is abundantly distributed in the mountain region and that of the piedmont plateau. The wood is heavy, hard, and strong, coarse grained and of a light ruddy brown. It is used for construction and cooperage and is rather valuable. When the black outer portion of the bark is removed, the inner portion is found to contain a coloring principle which stains the saliva yellow when it is chewed. This coloring principle is called quercitrine, or, from its acid reaction quercitric acid. Black oak bark is used for tanning also, but its yellow color makes it objectionable. The bark after being removed from the tree, is dried, ground between millstones and the coloring matters and tannins extracted with water and evaporated in vacuo until of the consistency of molasses—this is the well known bark extract of commerce.

A freshly prepared decoction of bark is transparent and of a dull orange red color, but after a time it becomes turbid, and yields a yellow crystalline compound. The supernatant liquor gradually becomes gelatinous, acquiring at the same time a blood red color, from this it may be inferred that a slow but gradual change has taken place, no doubt due to the glucoside being decomposed by a peculiar ferment. As the coloring matter thus liberated is rapidly oxidized, and becomes useless as a color-giving principle, it is important that the decoction should be used as soon as posible after its preparation, and for this reason we would say right here that where a fine clear yellow is required to be dyed, it is better to use the ground bark itself and not the extract, and precipitate all tannin matters from the decoction by means of glue before dyeing with it.

A freshly made solution of quercitron bark extract gives the following reactions:

Alkalis deepen the color.

Lime water deepens the color and gives a brownish red precipitate.

Alum brightens the solution forming a slight precipitate.

Proto-chloride of tin gives a brown precipitate.

Bichloride of tin, a yellowish precipitate.

Acetate of lead, a thick brownish-yellow floculent precipitate.

Acetate of copper an olive green precipitate, the liquor becoming yellowish green.

Salts of iron color the solution green, and afterwards give an olive-brown flocculent precipitate.

Acids brighten the liquor and give rise to a brown flocculent precipitate.

Acetic acid decreases the intensity of the color, but if the liquor is turbid it renders it clear.

Gelatin gives a reddish flocculent precipitate, containing probably all the tannin.

Chlorine gives an abundant flocculent precipitate. An excess of the reagent decolorizes the liquor.

Chevreul was the first chemist who examined this dyestuff, and he found it to contain, besides a peculiar tannin which has since received the name of *quercitannic acid*, a

yellow coloring principle to which he gave the name of *quercitrine*. This he obtained from quercitron back by boiling it with water and allowing the solution to stand when fine laminated crystals were deposited. It may also be prepared by exhausting the bark with alcohol, and after precipitating all the tannin matters by gelatine (glue), then evaporating the solution; the quercitrine crystalizes out of the boiling alcohol. It is, however, much more easily made from *flavin*, which consists largely of quercitrine. On boiling this dyestuff with water and filtering, a solution is obtained, which on cooling, deposits quercitrine in the crystaline state. Quercitrine forms minute rhomboid plates of a pale yellow color, which are only slightly soluable in ether or cold water, but more readiiy in boiling water, and easily in alcohol. Alkaline solutions dissolve quercitrine with a greenish yellow color, which becomes brown on exposure to the atmosphere. The aqueous solution gives a brownish yellow precipitate with baryta, while limewater imparts to it a fine yellow tint. The acetates of copper and lead give a bright yellow precipitate. Its most valuable and characteristic reactions, however, are with perchloride of iron, which gives a greenish yellow precipitate, and with proto-chloride and oxymuriate of tin, with which it gives beautiful bright yellow precipitates. All of these reactions give dyes of extreme fastness.

When quercitrine is boiled with water containing ten per cent. of sulphuric acid, it is decomposed and converted into *quercitin*, and a species of sugar represented by the formula $C_6H_{12}O_6$; this reaction proves quercitrine to be a glucoside. The quercitin separates into a flocculent precipitate, which being filtered and washed, can be crystalized from alcohol.

The chemical changes which occur when quercitrine is boiled with an acid may be expressed by the following equation:

$$C_{33}\ H_{30}\ O_{17} + OH_2 = C_{27}\ H_{18}\ O_{12} + C_6\ H_{12}\ O_6,\ OH_2$$

Quercitrine. Quercitin. Isodulcite.

To isolate the saccharine matter, the acid liquid from which the quercitin has been separated is neutralized with baryta to remove the sulphuric acid, and then evaporated, when the sugar is obtained in a crystaline state. This sugar is called *Isodulcite* $C_6\ H_{12}\ O_5 + OH_2$ and is incapable of fermentation, though it reduces Fehling's solution. It yields a trinitro derivative when treated with a mixture of sulphuric and nitric acids, as cellulose does, and is capable of conversion into high explosives like gun cotton.

Quercitin, $C_{27}\ H_{18}\ O_{12}$, crystalizes in slender needles of a bright yellow color, and of a much richer hue than quercitrine. It has no taste, is insoluable in cold, and only slightly soluable in hot water, but is freely soluable in alcohol and acetic acid. It is also soluable in alkalis, to which it communicates an orange yellow color. Its alcoholic solution gives orange precipitates with the salts of lead, baryta, and tin. It gives an orange color with perchloride of tin and a green coloration with perchloride of iron, but no precipitates with these two latter salts.

Quercitin dissolves in concentrated sulphuric acid, which solution dyes wool a fast permanent yellow without any mordant, a fact of which all woolen dyers had better make a note.

It has been found that when one part of quercitin is added to a boiling solution of three parts of caustic potash in one of water, and the whole evaporated to dryness, a product is obtained which consists of *paradatiscetin, phloroglucin* and *quercitic acid*. To separate these, as soon as the mass is cold it is dissolved in water and neutralized with hydrochloric acid, which precipitates the paradatiscetin with any unaltered quercitin which may be present. The filtered liquid is then mixed with one quarter its volume of alcohol, and agitated with ether which dissolves the phloroglucin and quercitic acid. To separate these two, the residue left on the evaporation of the ether solution is dissolved in water, and basic acetate of lead added; this precipitates the quercitic acid, and the clear solution, after the removal of the excess of lead by sulphuretted hydrogen and evaporation, yields phloroglucin in the crystalline state. The lead quercitate, after being washed, is suspended in water, decomposed by sulphuretted hydrogen and the lead sulphide separated by filtration; the aqueous solution, when evaporated in vacuo, yields crystalized quercitic acid. The paradatiscetin may be purified by dissolving it in alcohol and precipitating the unaltered quercitin by lead acetate; the alcoholic solution, after the excess of lead has been separated by sulphuretted hydrogen, is concentrated by evaporation, and the paradatiscetin precipitated by the addition of water.

Quercitic acid, $C_{13}\ H_{20}\ O_7$, crystalizes in fine white, silky needles, which are only slightly soluable in cold water, but freely soluable in alcohol, ether or hot water. This solution gives a dark blue coloration with perchloride of iron. An alkaline solution, when exposed to the air, assumes a magnificent crimson color. Quercitic acid dissolves in concentrated sulphuric acid with a reddish brown tint. When quercitic acid is fused with potash, a new acid called quercimeric acid is produced. It forms small prismatic crystals, which are readily soluable in water, alcohol, and ether. When this in turn is fused with potash it yields protocatechuic acid.

Paradatiscetin, $C_{15}\ H_{10}\ O_6$, is deposited from our alcoholic solution in yellowish needles, which are only slightly soluable in water but very soluable in alcohol and ether. Its alcoholic solution gives an intense purple color with perchloride of iron. The alkaline solution has a bright yellow color, which changes to green on exposure to the atmosphere. Bromine imparts to a solution of paradatiscetin a red color, which changes after a while to a magnificent crimson, whilst chlorine gives a reddish coloration. Paradatiscetin forms definite compounds with bases; those of barium and strantium crystallizing well.

Phloroglucin separates from its aqueous solution in hydrated crystals, belonging to the trimetric system, and having the formula $C_6\ H_6\ O_3\ 2OH_2$. Phloroglucin has a sweeter taste than sugar and undergoes no change by contact with the air. It dissolves in water and alcohol and still more readily with ether. It gives a precipitate with subacetate of lead, but more with other metallic salts. With perchloride of iron it gives a deep red coloration and with chlorine a yellow tint, which, however, soon disappears. Nitric acid converts phloroglucin into nitrophloroglucin.

FLAVIN.

A preparation of bark is made under the name of flavin; it varies greatly in composition, being sometimes nearly pure quercitrine, whilst other samples only contain quercitin. It is in most cases the product of the decomposition of quercitrine, the natural glucoside of the bark, by

the action of an acid. Flavin in solution gives the following reactions with metallic salts:

Persalts of iron give an olive black precipitate.

Protosalts of iron give a deep greenish black precipitate.

Protosalts of tin give a lemon yellow precipitate.

Persalts of tin give an orange yellow precipitate.

Alumina gives a rich yellow precipitate.

Acids brighten the color of the solution; alkalis deepen it, making it redder. The color produced by flavin is never good until raised.

Flavin is chiefly used for dyeing woolen and mixed fabrics yellow. To dye pieces of woolen goods weighing 22 to 23 pounds the process and proportions are as follows: For each piece two pounds of alum and one pound of tartar are put into a vat containing a sufficient quantity of boiling water, and flavin added according to the shade desired. The mixture is boiled for a few minutes, a pint of nitrate of tin per piece is then added to raise the color and the pieces are put in the kettle and boiled for about an hour.

In mixed fabrics the pieces are first dyed as described to dye the wool, then well washed until all traces of acid are removed, then passed full width through sumac, then a bath of muriate of tin and finally dyed in quercitron bark and alum to dye the cotton.

When cotton alone is to be dyed, it is done cold. After being prepared with sumac and tin the goods are dyed in bark and raised in tin spirits (oxymuriate of tin). When dyeing cotton yellow with bark it is better to add a little glue to the solution, before using it, so as to precipitate the quercitannic acid, which interferes with the brilliancy of the color.

We have shown that quercitron bark is capable of forming, in the hands of a dyer who is also a chemist, a large variety of products available as dyestuffs, but it is as a yellow and olive dye that its great usefulness consists. It contains a great quantity of tannin, which is always dissolved in the decoction, and which gives the solution of bark a large variety of uses. The quantity of tannin combined with it makes it very useful for olives; goods impregnated with an iron mordant, and passed through a solution of bark, take a beautiful olive. When used for green, the mordant employed is alumina; but for yellow the mordant used is chloride of tin.

By mixing small proportions of the various redwoods, sumac, etc., with the bark solution and mordanting and raising the goods with different kinds of the metallic salts, a vast number of different shades can be produced, all of which are bright and "bloomy" and possess a more or less great degree of fastness. The writer has in his receipt books samples of olives, yellows and greens dyed by him with quercitron bark 32 years ago and which are nearly as good today as they were the day they were dyed.

We give some of the receipts herewith, giving first of all the standard stock mixtures they are dyed with. Where pails are mentioned, the 10-quart pail is intended.

Quercitron bark solution: 36 pounds of quercitron bark extract, 40 gallons of water. Boil until dissolved and use at once as it will not keep.

Iron mixture No. 1: 43 pounds of neutral nitrate of iron, 40 gallons of water. Mix cold.

Iron mixture No. 2: 33 pounds of copperas, 31 pounds of alum. Boil until dissolved.

Chrome mixture: 40 pounds of bichromate of potash (or soda), 40 gallons of water, 10 pounds of soda ash. Boil.

Alum: 31 pounds of alum, 40 gallons of water. Boil.

Stannate of soda: 30 pounds of stannate of soda, 40 gallons of water. Do not boil.

Yellow prussiate of potash: 28 pounds of yellow prussiate of potash, 40 gallons of water. Boil.

Vitriol: 10 quarts of oil of vitriol, (sulphuric acid), 40 gallons of water. Cold.

Copperas: 33 pounds of copperas, 40 gallons of water, ½ pint of sulphuric acid. Boil.

Catechu or Cutch or Gambier: 450 pounds of catechu, 90 pounds of blue vitrol, 400 gallons of water. Boil up the catchu first until all is dissolved, then add the blue vitriol until dissolved and allow to settle before using.

All of the recipes which follow have been used for dyeing 20 piece (1000 yard) lots sewed together end to end and wound on a roll and dyed on a machine similar to

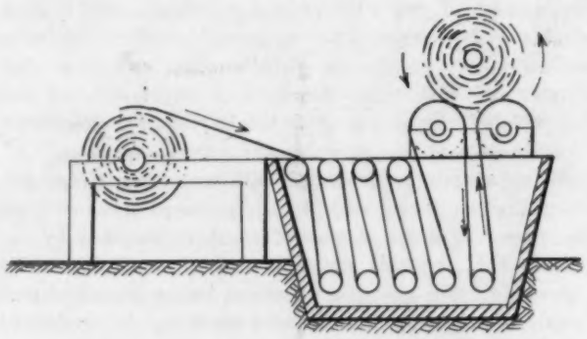


FIG. 1. A SINGLE BOX DYEING MACHING.

the one shown in Fig. 1. After running through the machine the goods are brought round on a truck and run again the same way for another run.

DEEP OLD GOLD.

Wet the unbleached goods out thoroughly in boiling water. Give two ends, or runs, in red liquor (acetate of alumina) standing at 3 degrees Tw., and dry up. Wet out twice in hot water and give four ends in bark using 8 pails of bark standard and 7 pails of water (we would say that the dye box in Fig. 1 is so constructed that it holds 15 pails of liquor up to the overflow and that as the liquor is added at the back of the machine, it flows out at the front or where the goods enter). Freshen the liquor up by adding one pail of bark standard to every fourth seam. This liquor is used cold. Next run twice in chrome cold, starting with one pail of chrome and adding two quarts of chrome in a pail of water on every fourth seam. Wash and squeeze.

A darker shade can be dyed by increasing the strength of the chrome liquor or by heating it. These give a beautiful heavy gold of great fastness.

YELLOW.

Yellow is dyed upon bleached goods only by preparing the goods in stannate of soda and sumac, and then dyeing with bark and raising with bichloride of tin. This color is not much dyed on cotton, the chrome yellow being brighter and faster, but on wool it is a good thing and we have given the formulas elsewhere for dyeing wool and union goods with quercitron bark.

DARK GREEN.

Wet the goods out in sumac and lay over night. Run

twice in iron liquor No. 1 full strength, adding one pail to every fourth seam. Run once in soda ash and wash well. Run twice in yellow prussiate, 5 pails to start and one quart of vitriol standard, add one pail of prussiate and one quart of vitriol to every third seam. Wash well and squeeze. Run twice in bark, 5 pails to start, one pail on third seam. Run twice in iron No. 1, 4 pails to start, one pail on fourth seam.

DARK OLIVE (BROWN SHADE).

Wet the goods out in hot water. Run twice in bark, full strength, freshen on second seam. Run twice in iron No. 1, full strength, freshen on fourth seams. Wash and repeat, and wash well and squeeze.

DARK OLIVE (GREEN SHADE).

Same as the last receipt but using iron mixture No. 2.

FAST TAN.

Wet out in hot water. Run once in cutch cold, 6 pails to start, freshen with one pail on the third seam. Run once in chrome cold, two pails to start, freshen one pail on third seam. Wash. Run twice in bark cold, 8 pails to start, freshen one pail on fourth seam. Wash and finish.

This tan can be modified by finishing off with alum to make it yellow, chrome to make it redder or copperas to make it darker, or a mixture of copperas and alum as given in the list of standard solutions. In any case this tan is of great fastness.

Very pretty shades of lighter olives can be dyed with bark and raised with copperas and alum. All kinds of browns can be dyed by mixtures of bark and cutch, raising with chrome, iron, copperas, alum, etc., and maroons by adding hypernic and raising with various tin spirits, plum spirits, etc.

Quercitron bark in the hands of a competent dyer is one of the most valuable dyestuffs we have and is quite capable of producing, in conjunction with other natural dyestuffs and metallic salts, a vast range of very useful colors to which there is almost no limit.

The Use of Prussian Blue.

BY M. FORT, M. SC.

In view of the present shortage in artificial dyestuffs, it is hardly necessary to explain how I was led to investigate the dyeing of prussian blue, and from that still further, to the production of a variety of useful shades on a prussian blue bottom. It would appear to be a well nigh hopeless task to devise new methods of dyeing prussian blue and natural dyestuffs in conjunction with it, but from an examination of old text books, and a collection of dyer's pattern books made by the late James Sharp, dating back nearly one hundred years, there does not seem much evidence of prussian blue being used as a mordant, apart from topping with logwood and fustic. I am of the opinion, therefore, that a good deal of information acquired in my recent experiments, is not only new to dyers of today, but remained undiscovered by the old dyers, or at any rate, unpublished. I am aware of the special use of prussian blue made by Konitzer in dyeing aniline black on wool.

PRUSSIAN BLUE ON WOOL.

The general properties of prussian blue, its excellent fastness to light and acids, and greatly inferior fastness to milling, alkali, and soap, are matters of common knowledge. It does not appear to be so commonly known that its fastness to alkaline re-agents is greater when dyed on wool than on cotton. Further, that an equal weight of red prussiate dyes a very much fuller shade than yellow prussiate from the ordinary bath containing sulphuric acid. The red prussiate, however, is much more expensive, and hence the yellow variety is commonly employed. It is now found that yellow prussiate can be much more economically employed by converting it into red prussiate in making up the dyebath.

In the commercial manufacture of red prussiate from yellow prussiate, chlorine is used. Thus:—

$$K_4Fe(CN)_6 + Cl = K_3Fe(CN)_6 + KCl.$$

The yield is not equal to the theoretical amount in practice, but it nevertheless seemed possible that a conversion of yellow prussiate, in making up the dyebath, might be advantageous. The first experiments failed, but chlorination of the wool before dyeing succeeded. Unfortunately, chlorination is out of the question for many fabrics. The best method, however, has been found to be to add sodium hypochlorite to the cold acidified dyebath containing yellow prussiate and sulphuric acid. A change in color is noticed, the bath becoming brownish but remaining clear. Care must be taken to allow for some of the sulphuric acid to be neutralized, and sufficient must be left free at the end to ensure dyeing.

Chemical spotting tests can be used to control the hypochlorite addition on the lines of the volumetric analysis of iron solutions, but the dyer will probably prefer to work in this way. Hypochlorite is added gradually with mixing until a distinct smell of chemick is observed. This is then removed by adding a small amount of bisulphite, ordinary wool being entered in the usual way, and dyeing proceeded with by raising to the boil in half an hour and boiling one hour. The shade develops more gradually and earlier than in the ordinary dyeing with yellow prussiate, and a much heavier shade results. An excess of bisulphite does not appear to have any detrimental action, but rather brightens the shade. The wool is not affected by such use of the hypochlorite. A good royal blue can be produced with 5 per cent of yellow prussiate at a much lower cost than with either red prussiate or a larger amount of yellow prussiate. I have not found the shade to be inferior in any respect to that produced by the usual method. It will be understood, therefore, that a bath prepared on these lines is a complete substitute for red prussiate.

Prussian blue is not always fast to rubbing in heavy shades, and it was found that the addition of 1 or 2 per cent bichrome improves the fastness to rubbing while dulling the shade and making it greener. The effect of tin salts and other additions for brightening the shade is well known. In my experiments, increasing the amount of sulphuric acid has been most potent in brightening the shade. In heavy shades, prussian blue gives a harsh handle to wool and the effect of mineral weighting is not favorable.

While ordinary washing turns prussian blue on cotton quite brown, on wool the shade will stand a certain amount of milling, becoming usually deeper. I have known cases where shades have become lighter on milling, and in this connection it must be remembered that the chemistry of prussian blue, and related blue compounds, is difficult to apply, by reason of the obscurity of the dyeing reactions in which the wool itself plays a leading part. Prussian blue on wool cannot safely be called fast to milling how-

ever, although it is much faster than seems to be commonly supposed.

PRUSSIAN BLUE ON COTTON.

In normal times, a certain amount of cotton is dyed with prussian blue alone, and in combination with chrome yellow for a green. The usual method is to pad in iron liquor, squeeze and fix in soda, thus producing iron buff. For medium to deep shades, this must be repeated. The buff is converted into prussian blue by immersion in a bath of yellow prussiate. Pale shades are difficult to dye level by this method, and a few years ago, Knecht proposed a modified method in which the cotton is first mordanted with tannin, and fixed with nitrate of iron, after which the tannin is destroyed with an alkaline bath of peroxide. The level iron buff thus obtained is then converted into prussian blue in the usual way. Both these methods are tedious, and it seemed to me that there was room for an alternative short method. Cross and Bevan, several years ago, described a test for lignocellulose fibers, *e.g.*, jute. By heating with a solution containing ferric chloride and red prussiate, these fibers are colored blue. The similarity between lignin and tannin induced me to try dyeing prussian blue single bath on ordinary tannin mordanted cotton, in a dyebath containing 2 per cent, chloride of iron and 5 per cent red prussiate.

The method was very successful, the temperature being gradually raised to the boil and boiled for half an hour. A very good shade can be dyed on 5 per cent tannin fixed with tartar emetic, stannous chloride, or aluminum acetate, (recommended recently by the author for improving the fastness to rubbing of basic dyes). Instead of tannic acid, sumac or cutch may be used for duller shades, but myrabolams was not found suitable. The fastness of heavy shades to rubbing is remarkably good. The method offers other advantages besides shortening the time, *e.g.*, the shade develops gradually and matching is greatly facilitated. Combined with the yellow of titanium tannate, it gives a green possessing many advantages over that obtained by the use of chrome yellow. Prussian blue on cotton is fast to light and acids, but is very sensitive to alkalis and hot soap solutions. An ordinary washing test turns it completely brown (iron buff).

PRUSSIAN BLUE AS A BOTTOM AND IRON MORDANT.

In normal times, iron mordants are expensive to apply to wool. They require a large amount of copperas, and also considerable amounts of tartar, oxalic acid, or other expensive organic assistant. Hence it has come about that the cheaper saddening method is more generally used, and where this cannot be applied, the use of iron mordants has been very restricted. Mordant dyes give shades faster to light when dyed on iron mordant than on any other common mordant except copper. In spite of the general dullness of shade, many of the natural mordant dyes on iron mordants supply some useful shades, possessing a fastness to light which many artificial mordant dyes might envy. It seemed to me, that a light shade of prussian blue, dyed on wool as already described, might prove more economical for use as an ironing mordant than the one usually applied, while providing a blue bottom fast to light.

Turning to a pattern book, containing a record of twelve months' exposure tests, made a good many years ago by one of my predecessors, I found a variety of natural dyes which had been compared for fastness to light on various mordants. Among the best, *viz.*, those which had withstood the test without bleaching or changing shade completely, were the following dyestuffs on iron mordanted wool:—Flavine, fustic, weld, camwood, (barwood was not as good), logwood, madder, cochineal, and lac. The preeminent fastness of these dyestuffs, as well as the apparent utility of shade entitle them to some consideration now.

It is, however, the shades which they give when dyed on a prussian blue bottom that I wish to describe here. The bottom used was dyed with 2½ per cent red prussiate and 5 per cent sulphuric acid. A similar bottom is obtained by using 3 per cent yellow prussiate with sodium hypochlorite as described. This bottom was topped with 50 per cent fustic, dyeing in the usual way at the boil, and a fine deep green, similar to Coerulein in shade, was obtained. Its fastness to light is taken to be that of fustic on iron. It withstands boiling with a 1 per cent solution of acetic acid half an hour, and came well out of a milling test. The milling liquor contained 5 parts soap and 2 of soda ash per thousand. Neither white wool nor cotton are stained, and the shade is little altered, being only slightly deepened. In fastness to rubbing, it leaves nothing to be desired. The handle of the wool is not deteriorated by the treatment.

Five per cent flavine on a similar bottom gave a similar shade of green. The shade was a little lighter after boiling with acetic acid, but in other respects similar to that obtained with fustic. Ten per cent alizarine paste on the same prussian blue bottom gave a very deep and solid navy blue which withstood both milling and acid, but is inferior in rubbing, being only moderate, about like a similar shade dyed with indigo in this respect.

CAMWOOD.

Camwood gave useful navy blue shades of good fastness all round, including rubbing. Thirty per cent of the wood was sufficient for a good navy blue. Ten to 20 per cent of logwood also gave a navy very similar to that just described. If bichrome has been added in dyeing the prussian blue, the shade is deeper, and with more logwood, becomes black. The brightness of these navies is largely dependent on the depth of prussian blue. Very fine, bright navies have been obtained by dyeing prussian blue four times as strong (10 per cent prussiate) and topping with 1 per cent haematein. Cochineal and lac on prussian blue give rather dull navies of good fastness however, including rubbing. They are not so easy to dye level as those mentioned previously. Finally, gallocyanine which is in use at present, is faster to light on an iron mordant, but is open to considerable improvement in this respect compared with the natural dyestuffs mentioned. A prussian blue bottom should be useful for this purpose. Dyed in this way, 5 per cent gallocyanine gives the brightest navy of the series, but its fastness, though moderately good, is not equal to that of the natural dyestuffs to milling, acids, or rubbing.

I have described mainly the production of navies, and these are about the most difficult shades to dye with good fastness at present. My own opinion is that, apart from withstanding special finishing agencies, the above described navies and greens will give full satisfaction in wear, especially the shades produced with fustic, camwood, alizarine, and logwood, which shows to greater advantage here than in logwood blue.

(Continued on page 293.)

Practical Problems Discussed by Cotton's Readers

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so indorsed. This department is open to all. Suitable letters are paid for in cash.

Answer To The Problem In Efficiency.

Editor Cotton:

The problem of efficiency published in the January number illustrates the importance of maximum production and shows how a loss of $2,600 was changed to a profit of over $10,000. The solution follows:

Formerly the mill produced 20,000 pounds of cloth per week or 1,040,000 pounds per year, with the following costs:

1,040,000 (lbs.) × 5c (piece work) =	$52,000
1,040,000 (lbs.) × 5½c (day work) =	57,000
1,040,000 (lbs.) × 7½c (sup. & ex.) =	78,000
Total cost to manufacture	$187,200

The goods were sold at 17¾ c per pound; 1,040,000 × 17¾c = $184,600 received for the cloth; $187,200 — $184,600 = $2,600 former loss per year.

Now the mill produces 22,000 pounds per week, an increase of 2,000 pounds per week, or 104,000 pounds per year. The mill pays the same amount for day pay as formerly, and practically the same amount for supplies and expenses. The only charge which has increased with the production is the charge of 5c per pound for piece work.

The following figures show the present cost:

1,040,000 lbs. at former cost =	187,200
104,000 lbs. at 5c per lb, piece wk.	5,200

1,144,000 lbs. = (total production) $192,400 = (total cost).

The goods were sold at 17¾c per pound, as formerly; 1,144,000 × 17¾c = $203,060 received for the cloth; $203,060 — $192,400 = $10,660 profit.

L. E. R. (Mass.)

Answers "Learner."

Editor Cotton:

Please allow me space in your paper to answer a part of "Learner's" questions in Cotton for February. I will answer his carding and spinning questions and a part of his weaving questions, so that I think he can understand them. I am not a weaver, so I cannot say just what per cent of the theoretical production he ought to get off of his looms.

To find the speeder productions, multiply the circumference of the front roll (1⅛ inch roll, 3.5343") by R. P. M. (112) this by minutes run per week (3600) and divide this by inches in one yard (36) and multiply this by the weight in grains of one yard of roving (1.333 × 1, and divide this by grains in one pound (7000). Multiply this by the number of spindles (2467) and this will be the theoretical production. It depends altogether on conditions, as to what per cent of this production a man can get, but under fair conditions, "Learner" ought to get 94 per cent of the theoretical production, and to find what that would be, we will multiply the theoretical production by .94. To find what per cent of the theoretical production we are getting, divide the pounds produced by the theoretical production and the answer will be the per centage. This also applies to the spinning. The following is the carding and spinning productions, theoretical, and what I think he ought to get, under fair conditions.

Example 1. 3.3343 × 112 = 395.8416 × 3600 = 1,424,929.76 ÷ 36 = 39,581.38 × 1.333 = 52,661.97 ÷ 7000 = 7.52 × 2467 = 18,551.84 × .94 = 17,438.72+ans.

Example 2. 3.5343 × 106 = 374.6358 × 3600 = 1,348,688.88 ÷ 36 = 37,463.58 × 1.208 = 45,256 ÷ 7000 = 6.46 × 2640 = 17,054.4 × .95 = 16,201.68 ans.

Example 3. 3.1416 × 107 = 336.1512 × 3600 = 1.210,144.32 ÷ 36 = 33,615.12 × .2825 = 9,496.271 ÷ 7000 = 1.356 × 16704 = 22,650.624 × .97 = 21,971.1 + ans.

Example 4. 3.1416 × 110 = 345.576 × 3600 = 1,244,073.6 ÷ 36 = 34,557.6 × .2083 = 7,208.348 ÷ 7000 = 1.029 × 16320 = 16,793.28 × .98 = 16,457.41+ ans.

The following is the theoretical production for the weaving, but as I said before, I am no weaver, so I cannot say just what percentage should be produced. Multiply the picks per minute (64) by the minutes run per week (3600) and divide by the picks of filling per inch (76) and divide this by the inches per yard (36) and multiply by the number of looms run (840) and divide by the yards per pound (4.25) and the answer will be the theoretical production.

Example 5. 164 × 3600 = 590.400 ÷ 76 = 7,768.421 ÷ 36 = 215.789 × 840 = 181,262.76 ÷ 4.25 = 46,650 ans.

I hope this will give Learner what he wanted, but should it not, I shall be glad to try again. H. J. M. (N. C.)

Editor Cotton:

In answer to "Learner" (S. C.) in the February issue, I submit the following results, allowing 10 per cent stoppage on the fly frames, 8 per cent stoppage on the spinning and 5 per cent on the weaving. The figures show that there is not enough 6¼ hk. roving being made to keep the warp spinning running steadily. There are 4000 pounds less roving made than the yarn to be made from it. The total amount of yarn spun is not sufficient to keep the looms running steadily unless the warp is very heavily sized.

The first production is explained in fullest detail step by step.

(A) (1⅛ in. × 3.1416) × 112 r.p.m. = the surface speed of the front roll in inches for one minute.

(B) Surface speed in inches per minute × 60 minutes

× 60 hours × 90 per cent = surface speed in inches for 60 hours with 10 per cent stoppage.

(C) Inches delivered in 60 hours with 10 per cent stoppage divided by 36 inches in one yard = the number of yards delivered in 60 hours with 10 per cent stoppage.

(D) Yards delivered, divided by the number of yards in one pound of the size delivered (6.25 × 840) = pounds of roving produced per spindle.

(E) Pounds per spindle × the number of spindles = the total production.

Synopsis: 1⅛" × 3.1416 × 112 r.p.m. × 60 min. × 60 hrs. × .90 ÷ 36 in. × 6.25 × 840 = 6.786 lbs. per spindle. 6.786 lbs. × 2467 = 16741 lbs. of 6.25 hk. roving.

Next, 1⅛" × 3.1416 × 106 r.p.m. × 60 min. × 60 hrs. × .90 ÷ 36 in. × 6.90 × 840 = 5.8203 lbs. 5.8203 lbs. × 2640 = 15365.6 lbs. of 6.90 hk. roving.

In the spinning, 1 in. × 3.1416 × 107 r.p.m. × 60 min. × 60 hrs. × .92 ÷ 36 in. × 29.5 × 840 = 1.24844 lbs. of yarn per spindle. 1.24844 lbs. × 16704 spindles = 20,854 lbs. of 29.5 single warp.

Then 1 × 3.1416 × 110 r.p.m. × 60 min. × 60 hrs. × .92 ÷ 36 in. × 40 × 840 = .94668 lbs. of yarn per spindle. .94668 lbs. × 16320 = 15,450 lbs. of 1/40 filling.

Now 164 r.p.m. × 60 min. × 60 hrs. × .95 ÷ 76 picks per inch × 36 in. = 205 yds. per loom. 205 yds. × 840 = 172,200 yds. of 4.25 yard goods. 172,200 ÷ 4.25 = 40,517.6 lbs. of cloth.

Summary:

16741 lbs. 6.25 hk. for 29.5's warp
15365 lbs. 6.90 hk. for 40's filling

32106 lbs. total roving

20854 lbs. 29.5's warp
15450 lbs. 40's filling

36304 lbs. total yarn

Production 40517 lbs. of goods woven.

Fillmore. (Penna.)

Alamance Textile Club Entertains.

The Alamance Textile Club, Burlington, N. C., entertained its members and invited friends at a supper and smoker, held in its rooms in the Isley Building, Saturday, March 18, from 7:30 to 10:30 P. M. There were about 45 present, with a wide range of textile men, mill presidents, secretaries, treasurers, mill engineers, superintendents, foremen, office men and invited guests.

J. G. King, president of the club, acted as toastmaster and did it in such a way as to make all present feel welcome and free to speak. Several impromptu talks were made, and plenty of good things to eat and smoke.

Sixteen of the guests present made application to join the club, among them some of the largest manufacturers of Alamance county, including Elihu Osburn, mill engineer of Charlotte, N. C. The evening was very pleasantly spent, and all present seemed to enjoy themselves.

The club has been organized only a short time, and has about 50 members and is composed of men immediately connected with the textile industry, including traveling salesmen, etc.

Why We Multiply.

EDITOR COTTON:

In reply to "A. C. D.," I offer him the following explanation of why we multiply to find the sum of intermediate drafts. In the example of card draft which he quotes, a total draft of 101.3 25 means that the surface speed of the delivery roll is 101.325 times greater than the surface speed of feed roll.

For simplicity of illustration we will assume a machine having 4 lines of rolls with a draft of 2 between each pair, making three individual drafts of 2. By adding the drafts 2 + 2 + 2 = 6, which is wrong, for we must express the drafts 2 × 2 × 2 = 8, and I give this explanation:

Take one yard of sliver, and give it a draft of 2, we would have two yards produced. Give this two yards a draft of 2, and we would have 4 yards. Then for a third time using a draft of 2, the four yards would be drawn out to 8 yards, or 8 times the original length. This is known as a draft of 8, or as we have already expressed it, 2 × 2 × 2 = 8.

H. K. (North Carolina.)

EDITOR COTTON:

In reply to "A. C. D.'s" question why do we multiply in order to obtain the draft on a card, this explanation may be of some use. Let us assume for purposes of clarity that one inch of cotton goes from the lap-roll to the feed roll and is then cut off. The draft between those two rolls is 1.176. Accordingly our original one inch of cotton would be drawn out to 1.176 inches, or 1.176 times the original inch which went in at first. Again between the feed roll and doffer there is a draft of 72. This means that the 1.176 inches of cotton which have passed in through the feed roll have been drawn out 72 times into a thinner but longer web. Continuing, there is a draft of 1.13 between the doffer calender roll and the doffer. Our cotton before entering the bite of the doffer calender roll would be 72 times 1.176 or 84.67 inches. If this amount is drawn out 1.13 times it would make a web 95.68 inches in length were no more drawing out to take place. But between the doffer calender roll and the coiler rolls there is a draft of 1.059. Hence our 95.68 inches are drawn out to a total of 101.325 inches.

Each operation is a drawing out of the cotton which has come through from the previous operation. Considering each as separate in itself, it is easier to understand why the total draft is obtained by multiplication and not by addition. D. (Massachusetts.)

EDITOR COTTON:

I will try to explain to "A. C. D." that he wants to study draft by speed. We will take four rolls of equal diameter, say one inch:

No. 1 roll makes 1 revolution,
No. 2 roll makes 2 revolutions, twice as many — 1 × 2 = 2
No. 3 roll makes 4 revolutions, twice as many — 1 × 2 = 2
No. 4 roll makes 8 revolutions, twice as many — 1 × 2 = 2

These added = 6

But this is not right, for No. 4 roll made 8 revolutions

to the one revolution of the No. 1 roll, so that a one-yard length of cotton passed through the No. 1 roll is twice as long when delivered by the No. 2 roll. 1 yard × 2 yards = 2 yards.

This 2 yards will be again twice as long when passed through the No. 3 roll, viz: 2 yards × 2 yards = 4 yards.

This cotton will again be twice as long when passed through the No. 4 roll, viz: 4 yards × 2 = 8 yards. Thus it is drawn 8 times, or a draft of 8. Substitute for the equal diameters, a card with a lap roll, feed roll, doffer roll, calender roll, and coiler roll—five rolls, and you will then see that an inch turned in at the feed roll, is subject to the multiple of intermediate drafts, because the length delivered by any roll, when considered separately, and again subjected to draft, will be made so many times longer in length. So many times! Multiplication! See?

Likewise, in doubling, double 6 into 1 in the breaker drawing, then 6 into 1 in the intermediate drawing, then again 6 into 1 in the finisher, and we have 6 × 6 × 6 = 216 doublings. Say your breaker drawing is as two rolls, the intermediate drawing is as two rolls, the finisher drawing is as two rolls then one yard of breaker delivers six yards of breaker; six yards of intermediate delivers 36 yards of intermediate and 36 yards of finisher delivers 216 yards of finisher drawing. Therefore we shall have a draft of six in each head, or a total draft of 216 in all. and not a draft of 18, as though added.

H. S. (N. Y.)

Editor Cotton:

The query of "A. C. D." (Mass.) in the February number regarding the multiplication of drafts may be answered by saying that every inch of sliver of roving running into a feed roller is drawn as many times as the surface speed of the feed is contained into the surface speed of the delivery and for that reason the total draft must be found by multiplying each succeeding draft by the previous one, where a series of drafts, as in the card. exist.

W. R. B.

Editor Cotton:

Replying to query of "A. C. D." in February Cotton, while not desiring to enter into formal competition, I would say that the question as to why we multiply instead of adding is a fair one and by no means foolish. Perhaps an example of the same kind of problem (slightly disguised) in everyday life may straighten out the tangle.

Take the ordinary table weights:

16 oz. of cotton equals 1 lb. of cotton
500 lb. " " 1 bale " "
4 bales " " 1 ton " "

Question: How many ounces in a ton of cotton? Do we add? We do not; we multiply.

Now take the question presented, remembering that "draft simply means the rate of speed of another part. That is:

1.1176 lap roll speeds equals 1 feed roll speed; 72. feed roll speeds equals 1 doffer speed; 1.13 doffer speeds equals 1 doffer calender roll speed; 1.06 doffer calender roll speed equals 1 coiler calender roll speed.

Question: How many lap roll speeds are there in one coiler calender roll speed? We find out by multiplying.

Lowell Tec. Student, (Mass.)

Editor Cotton:

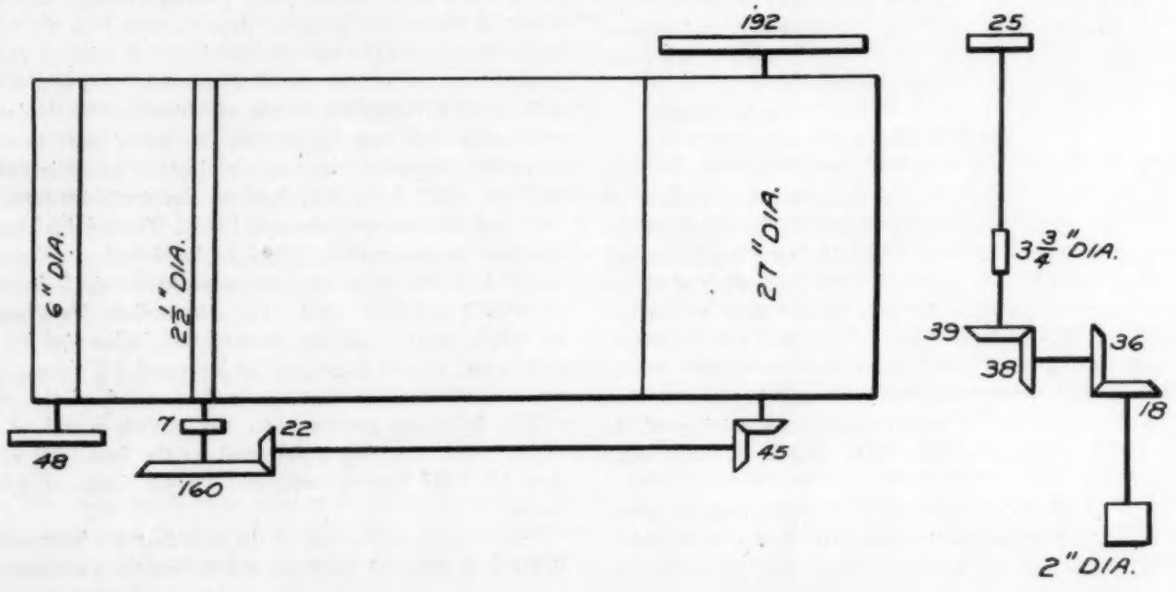
In answer to the question, "Why do we multiply the intermediate drafts to find the total draft?" signed by "A. C. D." in the February issue of your paper, I wish to submit the following, which I think will make the questioner see more clearly.

All who understand drafting know that when a machine has a draft of 4 it means that for every inch, foot or yard fed to the machine there are 4 inches, 4 feet or 4 yards delivered according to the term used.

The following sketch of a card with the diameter of rollers and numbers of teeth in gears will be used as an example, and the following equations and explanations will answer the question:

On this card there are four intermediate drafts, as follows: Tension draft between the cap roll and the feed roll; attenuating draft between the feed roll and the doffer; tension draft between the doffer and the doffer calender roll; tension draft between the doffer calender roll and the coiler calender roll.

The first draft is as follows: 48 × 2.5 ÷ 17 × 6 =



ONE INCH FED HERE	WITH A DRAFT OF 1.176	MAKES 1.176 INCHES FED HERE	WITH A DRAFT OF 78.54	MAKES 92.363 INCHES FED HERE	WITH A DRAFT OF 1.066	MAKES 98.45 INCHES FED HERE	WITH A DRAFT OF 1.094	MAKES 107.70 INCHES DELIVERED HERE

1.176, which means that for every inch fed by the cap roll the feed roll delivers 1.176 inches.

The next draft is: 1 60 × 45 × 27 ÷ 22 × 45 × 2.5 = 78.54, which means that for every inch fed by the feed roll the doffer delivers 78.54 inches. Then as the feed roll is feeding 1.176 inches and the draft is 78.54, the inches delivered by the doffer will be 1.176 × 78.54 = 92.363 inches delivered from the doffer for every inch fed by the feed roll.

The next draft is: 192 × 3.75 ÷ 25 × 27 = 1.066, which means that for every inch fed by the doffer, the doffer calender roll delivers 1.066 inches. Then as the doffer is delivering 92.363 inches and the draft is 1.066, the inches delivered by the doffer calender rolls are 92.363 inches fed, multiplied by 1.066 draft = 92.363 × 1.066 = 98.45 inches delivered by the doffer calender roll for one inch fed by the cap roll.

The next draft is: 39 × 36 × 2 ÷ 38 × 18 × 3.75 = 1.094, which means that for every inch fed by the doffer calender rolls, the coiler calender rolls deliver 1.094 inches. Then as the doffer calender rolls are feeding 98.45 inches, and the draft is 1.094, the inches delivered by the coiler calender rolls are 98.45 inches fed, multiplied by 1.094; the draft; 98.45 × 1.094 = 107.70 inches delivered from the coiler calender rolls for every inch fed by the cap roll.

This also equals the total draft of the machine: 48 × 160 × 192 × 39 × 36 × 2 ÷ 17 × 22 × 25 × 38 × 18 × 6 = 107.95.

The draft figured in this way is .25 greater than the previous one given. This difference is owing to having dropped some of the decimal places in the previous multiplications.

After summing up all this we can see by the sketch at the top of the page why we multiply:

1.176 × 78.54 × 1.066 × 1.094 = 107.75.

1.176 + 78.54 + 1.066 + 1.094 = 81.876.

Hoping everything has been made clear in the explanation, I should like to state that this question and answer department is very helpful to all, and I hope to see more questions and answers along practical lines.

Carder (Mass.)

Editor Cotton:

The following explanation is in answer to the query of "A. C. D. (Mass.)" as to the reason for multiplying the intermediate drafts together to get the total draft, instead of adding them in any machine in the processing of cotton where draft is introduced. This is not easy to explain clearly, so the simplest example possible will be taken. Instead of the card with numerous intermediate drafts, an intermediate roving frame will be used having only two intermediate drafts. A plan showing the driving of the rolls is given using common rolls and a 35-tooth draft change gear.

It is an accepted fact that the proper way to secure the total draft from the intermediate drafts is by multiplication and not by addition. This fact is usually accepted in the same manner as the alphabet without looking for the reason.

From the plan the total draft is found as follows:

$$\frac{1.25 \times 100 \times 56}{40 \times 35 \times 1} = 5 \text{ total draft}$$

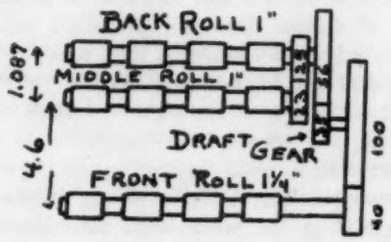
The intermediate draft between the middle and front rolls is found to be 4.6 in the following calculation.

$$\frac{1.25 \times 100 \times 56 \times 23}{40 \times 35 \times 25 \times 1} = 4.6$$

The other intermediate draft which is between the back and middle rolls is 1.087.

$$\frac{1 \times 25}{23 \times 1} = 1.087.$$

By multiplying the two intermediate drafts together, the total draft is found to be 5.0002.



The total draft first found through the gearing was 5. The slight difference of .0002 is caused by the last figure in the draft 1.087 being slightly off as the division did not come out evenly, but this figures close enough for any practical purpose. If the intermediate drafts had been added the total draft would have been 5.687.

What is the meaning of draft?

Draft is the number of times that a given length is increased; or the number of times that the weight of a given length is decreased while passing through any machine. Another definition for draft is that it is the number of times that the surface speed of the delivery roll is greater than the surface speed of the feed roll, and would be found by dividing the former surface speed by the latter.

Having laid the foundation, the proof will now be shown by example. Suppose one inch of stock is fed to the back roll. It is subjected to the draft between the back and middle rolls, which is 1.087. The original length has been increased from 1 inch to 1.087 inches. The new length 1.087 inches is now subjected to the draft between the middle and front rolls. The intermediate draft here is 4.6 which means that the length 1.087 inches fed by the middle roll to the front roll is increased 4.6 times. The draft "4.6" meaning that the surface speed of the front roll is 4.6 times greater than the surface speed of the middle roll. The length delivered by the front roll would then be 1.087 inches multiplied by 4.6 draft or 5.0002 inches.

Sight must not be lost of the fact that the intermediate draft is a part of the total draft. In the example used

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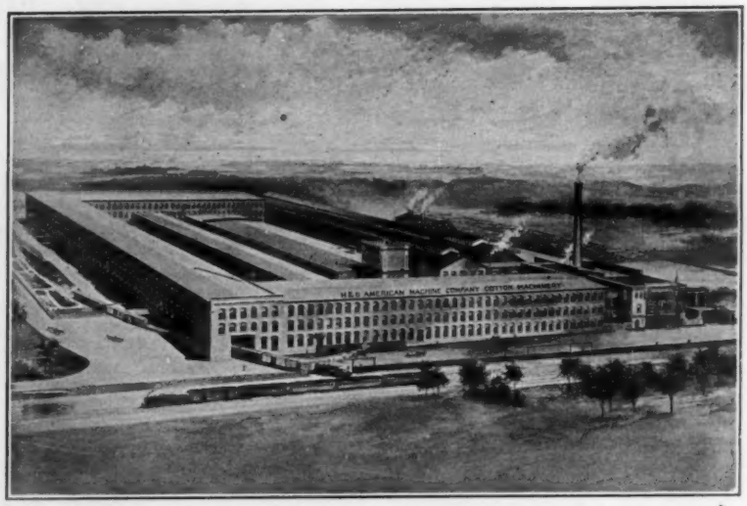
COTTON MACHINERY

Opening and Picking Machinery

Card Room Machinery



Spinning Room Machinery

Twisters for Wet or Dry Work

With Band or Tape Drive

H. & B. AMERICAN MACHINE COMPANY
PAWTUCKET, R. I.

the middle roll is the delivery roll for the 1.087 draft and at the same time the feed roll for the other draft. This establishes a relationship between the two drafts. The surface speed of the middle roll is so many times greater than that of the back roll, and the front roll surface speed is so many times greater than that of the middle roll. The length delivered by the middle roll is 1.087 times greater than that fed by the back roll, and the front roll delivers a length 4.6 times greater than that delivered by the middle roll and not 4.6 times greater than the length fed by the back roll. In other words each intermediate draft bears a direct relationship to the previous intermediate draft in the form of a ratio.

Another illustration might make the subject clearer. A piece of elastic webbing measuring 10 feet is increased in length 1.5 times. It would now measure 15 feet. This new length is now increased to 3 times itself, making the tape measure 45 feet. The last gain was 30 feet and the first gain 5 feet, making a total increase of 35 feet, but the total ratio of increase was 4.5 which corresponds to our draft.

Draft is a ratio of surface speeds, and when A is 10 times as great as B, and B is valued at 5, then A must be 50.

"Northwood" (Pa.).

The Klauder-Weldon Dyeing Machine Co., have moved into their new factory at Yardley, Pa., and all inquiries for their well known dyeing equipment should be sent to that address.

The Use of Prussian Blue.

(Continued from page 288.)

Although the fastness of prussian blue bottom is much inferior on cotton, I have been led to apply the same series of dyestuffs to produce similar shades on cotton which was first grounded with prussian blue in the single bath dyeing process above described. It is to be clearly understood that none of the shades here described, will withstand washing with soap or alkalies, owing to decomposition of the prussian blue; they turn brown. They do not bleed into the water however, and are also fairly fast to acids, although in every case, boiling with a one per cent solution of acetic acid removes a good deal of the natural dye. The most remarkable thing to me is their fastness to rubbing, which is very good indeed. Towards light, it may be assumed that they will prove very satisfactory. Camwood gives good navy blue shades. Logwood deep blue to black shades. A logwood black may easily be dyed on cotton by this method with the aid of fustic. Five per cent alizarine offers no advantage over 20 per cent camwood for topping prussian blue, either as regards the quality or fastness of the resulting shade. Flavine gives a good green which turns blue again on boiling with acid. Fustic gives a similar green, only slightly faster to acid.

So far as has been known, prussian blue has not yet received the attention it deserves from dyers who are hard put to it to supply bright blues and fast navies. If this article, the outcome of many experiments during the last few months, serves to draw attention to the possibilities of application in this direction, it will give great satisfaction to the writer, whose object is to provide assistance where it is most needed.—The Dyer and Calico Printer.

BOOK REVIEWS

All Books Reviewed Under This Heading May Be Procured From COTTON at the Published Price.

American Banking. By H. Parker Willis, Ph. D. 360 pages. Limp leather binding. Price $2.00 post paid. Published by LaSalle Extension University, Chicago.

The passing of the Federal Reserve Act in 1913 marked the beginning of a new era in banking, and much that the student of banking had regarded as essential was marked for elimination or change. But even without this important event there would be great need of a clear and thorough-going exposition of American banking. The subject is far-reaching; its roots are in the fundamentals of industry and it touches every field of human activity. Only an author whose minute knowledge was balanced by the broadest of views could be expected to present a well-rounded account of the banking of America. Such an author has been found in Dr. H. Parker Willis, secretary of the Federal Reserve Board. His book is complete, simple, concrete, and systematic. It begins by describing the general functions of banks, and giving a working definition of credit. Then follows an enumeration of the chief kinds of banks with a description of each. The actual course of banking is next set forth in detail, the bank loan in its simplest form being made the fundamental operation, and its complexities opened out by one with the testing of credit, single-name and double-name paper, the subject of deposits, domestic and foreign exchange, the co-operation of banks in establishing clearing-houses, the organization and management of a bank, and capital and reserve, which leads us directly into the governmental control of banking in America. This great subject is developed as the climax of the book, and it may be said without hesitation that Dr. Willis' account is the clearest and most satisfactory that has yet been published.

Investment and Speculation. By Louis Guenther, Editor of the Financial World. 290 pages. Bound in limp leather. Price $2.00 postpaid. Published by the La Salle Extension University, Chicago.

"Every head of a corporation," says the author in the preface, "every business man who holds a responsible position and upon whose judgment the success of an enterprise largely depends, should provide himself with a general knowledge of the problem of investment and speculation. Mr. Guenther is a recognized authority on the subject of investments. In a clear, simple way this book sets forth the fundamental facts in regard to the laying-out of money for gain. It recognizes both investment and speculation as necessary elements of modern business. It describes the various fields of investment—farm lands, city real estate, bonds of all kinds, and stocks. It explains the organization and methods of the New York Stock Exchange and similar institutions. It defines the terms of stock-marketing and shows how securities are bought and sold. It gives minute direction for investigating the character and prospects of investments. It discusses the fluctuation of marketing values and the cause and effect of panics. It tells how markets are manipulated for private gain and the evils that result therefrom. It utters a vigorous warning against the "get-rich-quick" lure and exposes in detail the tricks of those who use it. Finally, it lays down a few simple, common-sense rules for forecasting the movements of the market.

Credits and Collections. By Edward M. Skinner, R. S. White and H. E. Kramer. 266 pages. Bound in limp leather. Price $2.00 postpaid. Published by the La Salle Extension University, Chicago.

Strange as it may seem, this is the first book to be published on credits and collections. A few volumes have appeared that dealt with parts of the field, but no well-rounded treatment has been made before. Now we have it presented with gratifying fullness by acknowledged experts—Edward M. Skinner, formerly president of the Chicago Association of Commerce; R. S. White, collection manager, American Steel and Wire Company; and H. E. Kramer, collection specialist. The subject is as old as business itself, but the growing complexity of commercial transactions and the narrowing margin of profit give it an importance today that it never before possessed. The detailed analysis of the duties of Collection men is the subject of this book. The treatment is clear, interesting, often dramatic and inspiring, but above all practical. Broad knowledge, a high conception of the responsibilities of such work, and a shrewd understanding of human nature are seen on every page. The authors have each made a phenomenal personal success in the credit-and-collection field, and they speak out of the fullness of experience. Their book promises to be the standard adviser of credit and collection men.

Burrell Opens Two Belting Branches.

E. L. Burrell, of the Burrell Belting Company, Chicago, has just opened a branch at Atlanta and one at Mobile, where a complete stock of all widths and lengths will be kept. The Atlanta branch is at 45 South Forsyth Street, in charge of W. L. Scott, manager of the southern department, and that at Mobile is at 14 South Water Street, in charge of J. E. Casey, branch manager. Mr. Burrell says that these branches were established to accommodate the demand which has been built up for Alfalfa and Burmaline belting, the two kinds of belting manufactured by the Burrell Belting Company. Mr. Burrell says that Burmaline, which is a belt with a core, for use in dry places, has given satisfaction in many cases where leather belt has failed. Alfalfa belting is used in wet places, or where belting is exposed to dampness or to the weather. He states that his company marketed 1,573,187 feet of belting in 1915.

Don't think you are overworked. There are lots of times when you are not busy. Just because you are on duty eight or ten hours doesn't prove you are too heavily loaded. It's true you are required to stay in your office; many men are confined in jails for months, with nothing to occupy their minds. You should be thankful that you have something to occupy every minute of your time. And the better results you get from each minute, the happier you will be.

Barrett Specification Roofs on the Robert Gair Buildings, Brooklyn, N. Y.
Architect: William Higginson, 13 Park Row, New York City
Gen. Contractors: Turner Construction Co., 11 Broadway, New York City.

On a Great Group of Concrete Buildings

THE huge plant of the Robert Gair Co. in Brooklyn includes four enormous structures of reinforced concrete and two old brick buildings.

One of these is the highest reinforced concrete building in the world and the group as a whole is the biggest single group of reinforced concrete buildings ever erected for one concern.

All the buildings, old and new, have The Barrett Specification type of roof.

The reasons for choosing these roofs were a desire to secure the best results at the lowest unit cost.

Just as the reinforced concrete walls take care of themselves and involve no maintenance expenses, so The Barrett Specification Roofs cost less to construct than any other permanent roof covering and require no care or attention.

The Turner Construction Company, which built these reinforced concrete buildings, has constructed hundreds of other such structures throughout the country, and The Barrett Specification type of roof covers at least 95% of all the buildings they have erected.

Engineers, architects and builders know the sound economies of Barrett Specification Roof construction and usually prefer such roofs to any other kind.

Barrett Specification Roofs take the base rate of insurance and are approved by the Underwriters' Laboratories.

Copy of The Barrett Specification, with roofing diagrams, will be sent free on request. Address our nearest office.

Tar Rok Sub-Floors
(Tar Concrete)

This specification provides a method for building a wood floor directly on the ground without risk of dampness or decay of the wood. The plank is bedded directly in tar concrete excluding all air below, making a fireproof and extremely rigid construction. It costs much less than piers and heavy timbers and the extra excavation necessary to give air space beneath. The weight the floor will sustain is practically unlimited. Used for upwards of thirty years in many famous mills with perfect satisfaction. This specification is simply the best proved method for getting the desired results at a minimum cost. Booklet on request.

Velvex Creosote Shingle Stains

Preserve the wood and prevent decay.

The stains are made in every color and special tints can be matched if desired.

Booklet free on request.

The Barrett Company

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh
Detroit Birmingham Kansas City Minneapolis Salt Lake City Seattle Peoria
THE PATERSON MFG CO., Limited: Montreal Toronto Winnipeg Vancouver
St. John, N. B. Halifax, N. S. Sydney, N. S.

TRADE B MARK

Notes About Men You Know.

JAMES F. MARSHALL, of Philadelphia, has accepted the position of master mechanic at the Fulton Bag & Cotton Mills, Atlanta, Ga.

M. B. BOSEMAN has resigned as overseer of spinning at the Sanford Cotton Mills, Sanford, N. C., and accepted a similar position with the Dresden Mills at Lumberton, N. C.

ROBERT J. H. BETHEL, whose resignation as overseer of the weavers at White Rock Mill, White Rock, R. I., took place recently was presented with a gold watch, appropriately engraved, by the weavers in a body. Mr. Bethel has been in charge of the weaving department at the mill for four years and as the gift would indicate was well liked by those under his supervision.

LEONARD C. LAPHAM, treasurer of the Nonquitt Spinning Co., New Bedford, Mass., is on a trip to Florida.

JOHN PIERSON, formerly superintendent of the Valley Creek Mills, Selma, Ala., has accepted the position of superintendent of the Clark-Pratt Cotton Mills, Prattville, Ala.

J. A. A. W. CLARK, of Augusta, Ga., has been elected president of the newly organized Clark-Pratt Cotton Mills, Prattville, Ala.

R. G. CAMPBELL, for many years general superintendent of the Proximity and White Oak Mills, at Greensboro, N. C., will be superintendent of the Rockfish Mill (formerly Hope Mills Mfg. Co.) at Hope Mills, N. C.

ROBERT MARSDEN, an overseer in the Burton Yarn Co.'s mill at Clinton, Mass., has been made superintendent of the mill.

ARTHUR L. BURTON, overseer of mule spinning at the Butler Mills, New Bedford, for the past 14 months, has resigned his position for a larger one.

MILTON J. BENTLEY, overseer of carding at the Bennett Mill of the New England Cotton Yarn Co., at New Bedford, is to be at the head of the textile department of the Connecticut State Trade School, located at Putnam, Conn.

H. C. DRESSER, general superintendent of the Martel Mills, Egan, Ga., Middleburg Mills, Batesburg, S. C., Lexington Mfg. Co., and Saxe Gotha Mills, Lexington, S. C., Valley Falls Mfg. Co., Spartanburg, S. C., and Palmetto Mills, Columbia, S. C., has also taken charge of a mill in Pennsylvania.

H. BURNHAM, well known for his many years' experience in the textile field as a cotton mill superintendent, has accepted a position with William Firth, Boston, Mass.

WILLIAM H. SHAW, superintendent of the Burton Yarn Co., Clinton, Mass., has resigned his position and returned to his home in Worcester.

FRED R. SHEPPARD has been promoted from overseer of spinning at the Cannon Mills Nos. 1, 2 and 3, Concord, N. C., to superintendent of the Barringer Mfg. Co., Rockwell, N. C.

EDWARD W. DEWEY has been made manager of the Bennington Hosiery Mills, Bennington, Vt., in place of Henry Field, resigned.

B. J. DOBBINS, general superintendent of the Caroleen and Henrietta Mills, Caroleen, N. C., was married recently to Miss Maybelle Langston, of Clinton, S. C. Congratulations!

CHAS. A. DAVIS, of Bessemer City, N. C., has accepted the position of superintendent of the Danville Knitting Mills, Bon Air, Ala.

B. H. LAYTON has resigned as superintendent of the Barringer Mfg. Co., Rockwell, N. C.

R. S. REINHARDT, president of the Elm Grove Mills, Lincolnton, N. C., left this week for a trip to Cuba.

HENRY FIELD, manager of the Bennington (Vt.) Hosiery Co., has resigned his position.

J. ALDEN MILLER, who has been superintendent of the textile department of the Putnam (Conn.) State Trade School, resigned his position to take effect March 1. Mr. Miller, who comes from Fall River, has become general manager of two mills in the South.

JOHN HAMBLY, the well-known ex-treasurer of the Quidnick-Windham Mfg. Co., has removed to Providence, R. I., where he has established a business in cotton yarns, cloth and mill supplies.

C. F. HETRICK, manager of the Hetrick Hosiery Mills, was in Philadelphia, Pa., on business recently.

CHARLES E. FOSTER, of the Park Spring Dyeing & Bleaching Co., has accepted the position of dyer with the Paragon Worsted Co. Mr. Foster, it is understood, will retain his interest in the Woonsoocket Dying Co.

J. M. JORDAN has resigned as overseer of carding and spinning at the Putnam Mill and Power Co., Eatonton, Ga., to become overseer of carding at the Adelaide Mill, Anniston, Ala.

J. F. BROWN, overseer of spinning at the Long Mill of the Riverside Mills, Danville, Va., has been given charge of the carding also.

S. M. SMITH, of the Mineola Mills, Gibsonville, N. C., has accepted the position of overseer of carding at King Mills, Burlington, N. C.

D. L. BOULWARE, of Charlotte, has accepted position of night carder at the Franklin Mills, Concord, N. C.

J. F. THOMPSON has resigned as superintendent of the Danville Knitting Mills and accepted a position with the Muscogee Mills, Columbus, Ga.

J. A. D. SIMS has been promoted from second hand to overseer of weaving at the Ottaray Mills, Union, S. C.

C. F. PATTERSON has been promoted from engineer to master mechanic at Ashcraft Cotton Mills, Florence, Ala.

JOHN MORROW, of Hope Mills, N. C., has accepted the position of overseer of spinning at the Aragon Mills, Rock Hill, S. C.

J. M. WADDLETON has been promoted from second hand to overseer of weaving at the Inverness Mills, Winston-Salem, N. C.

C. M. PADGET has resigned as second hand in carding at Buffalo, S. C., to become overseer of carding at the Ottaray Mills, Union, S. C.

W. M. KING, overseer of spinning and slashing at the Jno. P. King Mill, Augusta, Ga., has also been given charge of the spooling and warping.

Pyrene
FIRE
EXTINGUISHERS

The Conquest of the Cotton Fire

Quenching a cotton fire is almost as hard as cornering cotton—
Unless you use Pyrene.

Pyrene puts out cotton fires—and all fires—before they get big. The mammoth Woodside Cotton Mills, at Greenville, S. C., find Pyrene as necessary to successful operation as their 112,128 spindles, or their 2,702 wide looms. The foremost warehouses, cotton mills, gin houses, and cotton seed oil mills are equipped with Pyrene.

Pyrene won't deteriorate. Always ready. Never in the way. A boy of ten or an unskilled workman can operate it.

Inspected, approved and labeled by the Underwriters' Laboratories, Inc.

900,000 in use—sold by hardware and auto dealers.

Pyrene Manufacturing Company, 102 Vanderbilt Ave., New York City

Atlanta Nashville Baltimore Dallas

Makers of a Complete Line of Fire Protection Appliances

J. C. KELLER, formerly superintendent of the Johnson Mfg. Co., North Charlotte, N. C., has accepted the position of carder and spinner at the Mecklenburg Mill of same place.

J. O. CORN has resigned as overseer of carding at the Ottaray Mills, Union, S. C., and accepted a similar position at the Granby Mill, Columbia, S. C.

W. W. GREER has resigned as overseer of weaving at the Ottaray Mill, Union, S. C., and accepted a similar position at the Granby Mill, Columbia, S. C.

W. H. GRAY of Kannapolis, N. C., has accepted the position of overseer of weaving at the Jamack Cotton Mills, Salisbury, N. C.

C. A. FOX has resigned as second in spinning at High Shoals, N. C., to become overseer of spinning at the Rhodes Mfg. Co., Lincolnton, N. C.

J. L. WOFFORD has resigned as second hand in weave room No. 3 at Clinton (S. C.) Cotton Mill to become overseer of weaving at the Lydia Mills of the same place.

I. W. KING has resigned as overseer of carding at the Avondale Mills, Birmingham, Ala., to become overseer of spinning, spooling and warping in the new mill of the Lancaster (S. C.) Cotton Mills.

T. F. BLUME has resigned as overseer of spinning at the Florence Mills, Forest City, N. C., and accepted a similar position at the Cannon Mills Nos. 1, 2 and 3, Concord, N. C.

L. I. CROUCH has resigned as night second hand in spinning at the Johnson Mfg. Co., Charlotte, N. C., to accept a similar position on day run at the Roberta Mfg. Co., Concord, N. C.

C. D. BOLING, formerly master mechanic at the Fulton Bag and Cotton Mills, Atlanta, Ga., is now superintendent of the Mountain City Foundry and Machine Co., Greenville, S. C.

J. C. JONES has accepted the position of overseer of weaving at the Panola Mills, Greenwood, S. C.

J. P. INGLETT has resigned as second hand in carding at the Merrimack Mills, Huntsville, Ala., to become overseer of carding at the Avondale Mills, Birmingham, Ala.

T. B. REED has been transferred from cotton buyer to overseer spinning at the Florence Cotton Mills, Forest City, N. C.

J. T. INGLE has become master mechanic at the Knoxville (Tenn.) Spinning Co.

G. S. KATES has been promoted from second hand to overseer of the cloth room at the Equinox Mills, Anderson, S. C.

GEORGE C. WELCH has been promoted from overseer of cloth room to assistant superintendent of the Equinox Mills, Anderson, S. C.

JOHN V. MARR, of Hope Mills, N. C., has accepted the position of overseer of spinning at the Aragon Mills, Rock Hill, S. C.

E. W. HOPPER, formerly overseer of spinning at Aragon Mills, Rock Hill, S. C., has accepted a similar position at the Steele's Mills, Rockingham, N. C.

A. F. GLOVER has resigned as overseer of carding at the Graniteville (S. C.) Mfg. Co.

JAMES DUNSMORE, of the Western Knitting Mills, Rochester, Mich., the cloth finishing specialist who recently resigned his position with the mills, is now with the Carbondale (Pa.) Mills.

WILLIAM H. EDDY has been made overseer of carding at the Weetamoe Mills, Fall River, Mass., in place of John Brady, resigned.

WILLIAM ELLIOTT has accepted a position as overseer of spinning at the Shetucket Mill, Norwich, Conn.

JAS. AIRY, of Elberton, Ga., has accepted the position of overseer of weaving at the Hamilton Carhartt Mills, Rock Hill, S. C.

Goodrich Salesmen Convene.

A salesman's conference of unusual significance convened in Akron, O., March 2 and 3, at the plant of the B. F. Goodrich Company, largest rubber factory in the world. The event, under the direction of W. O. Rutherford, general sales manager of the corporation, was a good-fellowship "homecoming" attended by 450 Goodrich salesmen from every section of the country except the Pacific coast.

Sales problems and policies were not discussed at this conference. Rather, the program centered around the one idea of bringing into closer personal relationship the many specialized units of the Goodrich sales organization in a way never before attempted. Men who sell Goodrich automobile, truck, bicycle and motorcycle tires, boots and shoes, belting, hose, mechanical goods, drug sundries, etc., "rubbed elbows" together, as members of one great commercial family. The salesmen being brought to Akron and returned to their territories in four special trains.

A trip through the great Goodrich factories afforded the salesmen an opportunity to get first-hand information on rubber manufacture. Three new factory buildings, erected during the last six months and adding 700,000 square feet to the rapidly-expanding Goodrich plant, were also inspected. The conference good-fellowship banquet was followed by an informal vaudeville entertainment in which talented department heads and visiting salesmen took leading parts.

Addresses which sounded the note of promised future prosperity for the B. F. Goodrich Company were made by W. O. Rutherford, general sales manager; E. C. Shaw, second vice-president; C. B. Raymond, secretary; E. C. Tibbitts, advertising manager; J. C. Lawrence, credit department manager. Dr. W. C. Geer, head of the development department, told the wonderful story of how crude rubber is successfully compounded to make it adapted to the hundreds of commercial uses to which it is the pre-eminent ingredient today.

Cotton Chats for February, 1916, contains a number of interesting extracts from the multitude of congratulatory letters received by the Draper Company, Hopedale, Mass., in response to their one hundredth anniversary announcement recently issued.

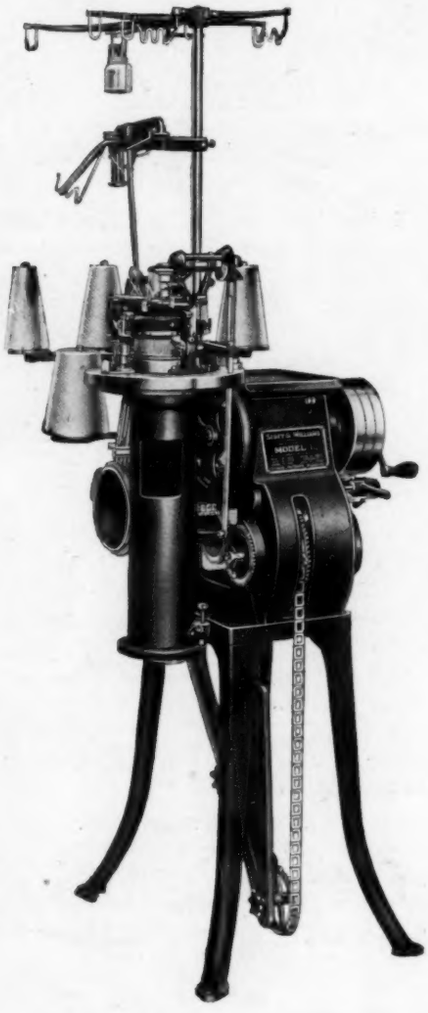
The Masury-Young Company of Boston, Mass., have been manufacturing specialties for the textile field for many years. Myco twister ring grease and non-fluid oil are two of these specialties which are well known to the trade.

KNITTING SECTION

The attention of all Manufacturers of

WOMEN'S HOSE

is invited to our new



Fashioned Welt Machine MODEL K

This machine produces women's hose with an inturned knitted welt similar to that produced on full fashioned machines. The machine has all the features of our other models—each stocking being dropped from the machine complete, except for the looping of the toe. It is fitted with five yarn changing fingers, inserts an "anti-run-back" course, and, the welt being knitted on the machine, has all the elasticity of the fabric and may be made as wide as desired.

Write for samples and further information

ESTABLISHED 1865.

Scott & Williams

Incorporated.

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MERCERIZED YARNS

Dyers—Bleachers—Gassers

Dyers of

Colors Fast to SUN and BLEACHING

ABERFOYLE
Manufacturing Company

CHESTER, PA.

402 Morris Building
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The Dawn of Better Light for the Mill

We are living in a sanitary age. Dingy, unsightly, light-absorbing and unhealthy walls and ceilings in cotton mills are rapidly passing.

Mill efficiency is the watch-word of every up-to-date mill man. And mill efficiency is impossible in a badly lighted and unclean mill.

Contrast the snow-white walls and ceilings of the mill where UPCO Porcelain Enamel has been applied, with the dirty oil-stained walls of another where cheap water paints were used.

UPCO Porcelain Enamel reflects all the light into every dark corner; saves from 15 to 30% of your lighting bills; improves the health of every employee by the sanitary conditions it produces and encourages; increases their efficiency, thus increasing your production.

UPCO Porcelain Enamel will positively stay white longer than any other *white* made. It will retain its high gloss no matter how often washed.

UPCO Porcelain Enamel applied alongside any other mill white will prove its superiority at once and years later.

An interesting book "Light Without Power" will be sent free to every mill man.

Ask for it on a post card today.

The Ullman-Philpott Co. Cleveland, Ohio

Industrial Paint and Varnish Manufacturers.

Embroidering Knitted Fabrics

BY WILLIAM DAVIS, M. A.

DESIGNING.

In considering the field for designing this kind of knitted fabric it will be instructive to revise the elements at the disposal of the designer and to recognize not only the scope but also the limitations imposed upon him. The effects are to be produced in a vertical direction and the first step is to make the straight plain stripe with colored yarns. We have to determine the width of the stripe itself, the number of fancy yarns of which it is to be composed, the distance apart of the stripes as they appear in the cloth, and also the variety and choice of colors for the striping yarns. For plain stripes the customary width varies with the article to which the pattern is to be applied; for shirts the pattern can be made wider and bolder than for hose and half-hose where a smaller and neater effect would be more desirable. From the point of view of economy, it is not advisable to introduce the fancy yarn at very short intervals such as for example 1 and 1, or 2 and 1, for a knitting machine can produce much more effective all over designs than could be here attempted.

The method adopted for staple classes of goods is to introduce say 3 to 5 fancy yarns at intervals of 1 to 2 inches of width, the stripe being made up of a row of plain and a row of colored thread alternately. This will be made clearer by referring to the design illustrated in Fig. 4, which is typical of a class of effect which has a wide sphere of usefulness in the knit goods industry. The stripe is two inches in width and consists of rows of three embroidered lines worked out in two colors, the outside colors being the same and the center line being of a second color. The whole design covers 36 needles or stitches in width, the pattern being 31 ground, 1 heliotrope stripe, 1 ground, 1 green stripe, 1 ground, 1 heliotrope stripe.

To produce this on the frame, the first work is to select the colors and have them wound as indicated, from the large bobbin onto smaller bobbins and of such a size that it is certain they will run to the end of the order. The next work is the placing of these bobbins on the frame stand above the needle bar at the required distance apart. This latter point is better done from the guide points as they require to be counted for the pattern. If there were present in the guide bar one point for every lead, or second needle, then for the ground we should miss 15 points, thread heliotrope, green and heliotrope in the next three in order, making an extent of 18 guide points.

The entire guide bar receives its composition motions from the usual levers in approaching the needles, casting the threads round the shanks and returning to their first position. Before this can be repeated it will be seen that some sidewise motion will require to be imparted to the

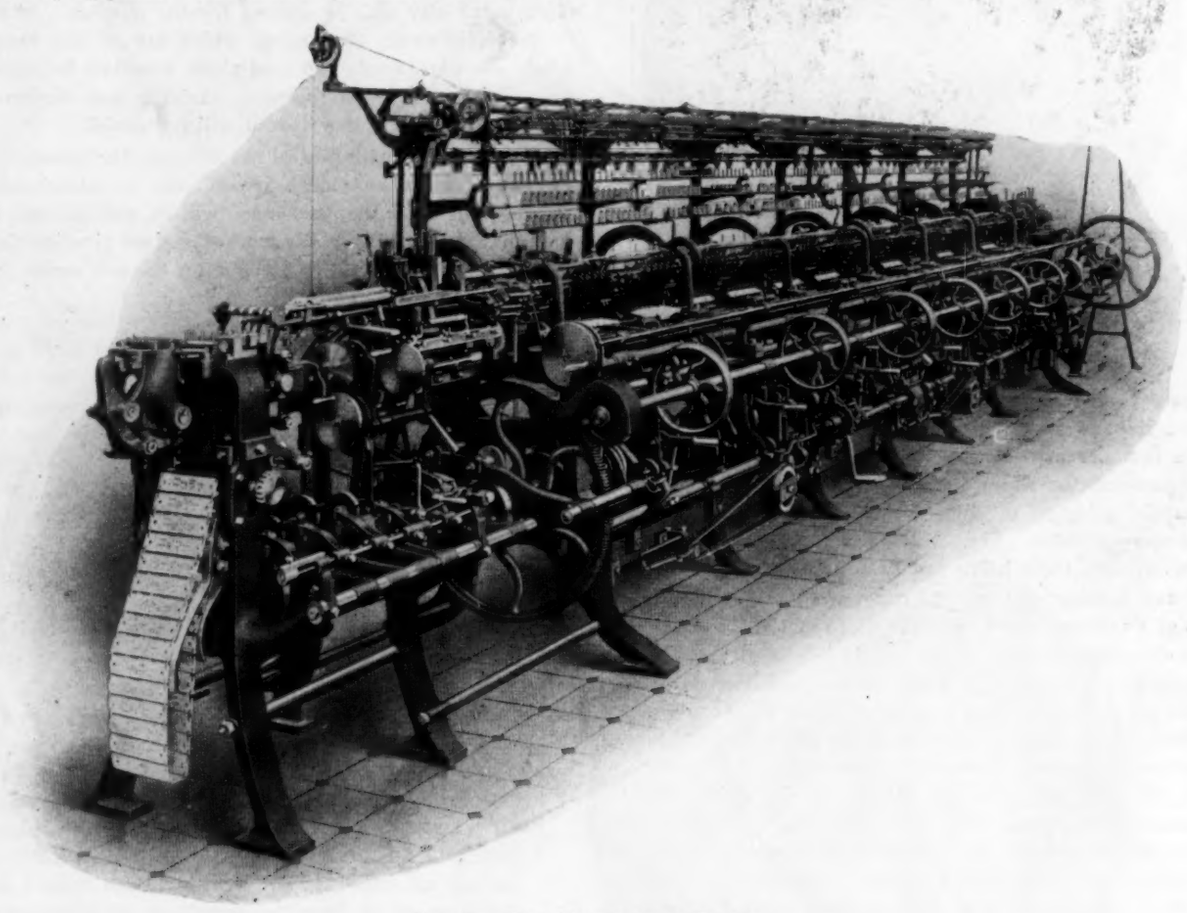

Fig. 9. The Embroidery Frame.

MERCERIZED YARNS

Dyers—Bleachers—Gassers

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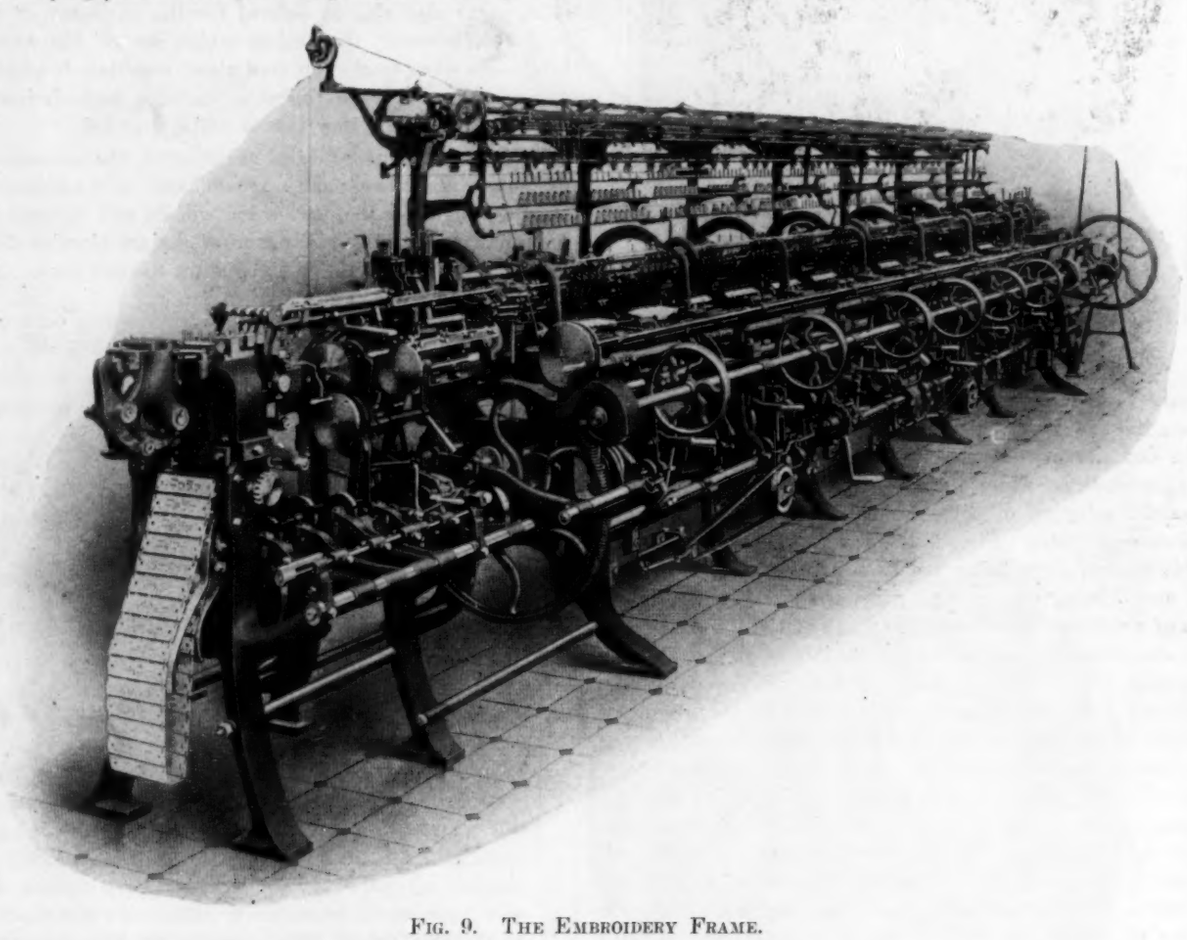


Fig. 9. The Embroidery Frame.

point bar in order that the lap may take place over the same needles at every course, and this is provided for by the small tappet at the side which is cut with two heights, the higher one of which pushes the bar to the right to lap the fancy yarns, and the lower one causing the bar to return to its former position.

For all stripes of this character the sidewise motion is identical, a needle space to the right and reversed a needle

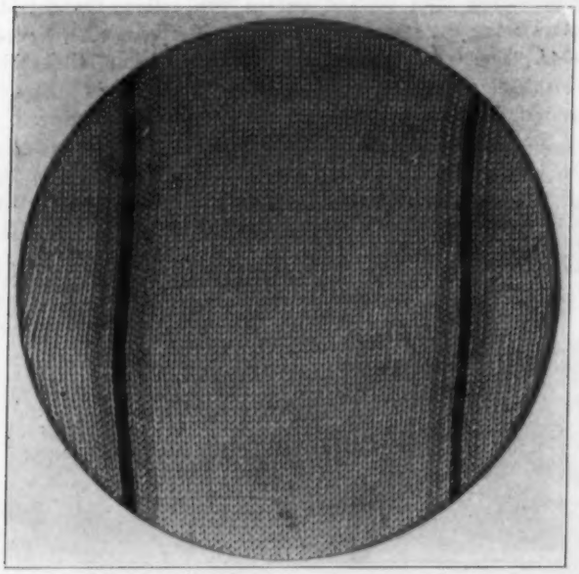


FIG. 4.

space to the left to complete the cycle. This being the case if plain stripes are desired, the only avenues open to the designer are the selection of the order of the fancy yarns, and the width they should be spaced, along with tasteful selection of colored styles and suitable materials possessing lustre. Fig. 5 shows a further elaboration of this system, there being five lines in the stripe, lines 1, 2, 4 and 5 being of the same color, whilst the center line 3 is of a different shade. As the width of the stripe is greater the distance apart of the stripes is also correspondingly greater, for example 27 guides missed and 5 occupied with colored yarn would be equitable. Next to the absolutely plain stripe may be considered the alternate one, that is a line of 3 alternating with a line of 5 or a line of 1; as a rule the more yarn employed in the stripe and the greater the number of needles occupied, the farther apart should the stripes be. The designer should possess taste and a notion of what is termed balance of pattern and color. In this direction there is great scope for the training of operatives even in the plain goods trade. How many designs do we see which offend all the most elementary laws of color and are also positively wasteful in point of resources. The aim of all such fabrics should be effectiveness with the minimum use of embroidery threads, many patterns produced being vastly overloaded, a smaller and simpler style giving a more effective and attractive result. This is often seen in regard to the colors selected. Frequently these are not of a tone which harmonizes with the ground and the colors themselvs are either too strong or too weak for the purpose. The tone and strength of the fancy color should always bear a certain relation to the tone of the ground and of heightened intensity. The intensity also depends on the quantity of the color used, if larger quantities are employed, then the strength must be modified or a discordant result will be forthcoming. As a general rule the moderate colors can be introduced in larger quantities and the stronger and more vivid colors should be more sparingly used. For example in design fabrics Figs. 4 and 5, the center line of the stripe should be much brighter than the colors on either side, for it is only one row, whilst the others have several rows in which to show up their intensity.

It is, of course, impossible to give any rules which can be accepted as empirical on the subject. If the ground color be white then the coloring is more easily performed. Lavender, heliotrope, blues, greens, black and salmon colors are favorites on a white ground and very often marl or two-colored threads are employed by using any two of those colors together. A thin count is chosen and the two colors mounted side by side on the frame and run through the eyes of the guides as one. Ready folded twist yarns may also be secured for the purpose. It will be noted, however, that colors which are of the correct brightness when single and used alone, lose their brightness and effectiveness when folded so that for such designs a larger quantity of fancy thread will be needed.

When the ground fabrics are colored, the question of designing is rather more difficult and a manufacturer seeking orders for the new season will do well to make for himself a range of specially worked designs showing forth the shades which are to be in vogue for the new season, and

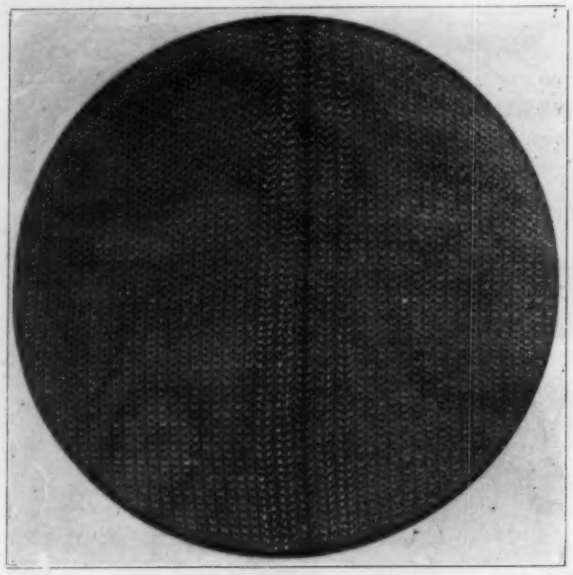


FIG. 5.

if he is possessed of true initiative, he will endeavor to lead the way by some pleasing color combination or novel selection of design. If he can strike on some innovation such as this, it will well repay the work and the time spent in experimenting.

Of variations in the form of the plain stripe the alternate form is perhaps the most attractive. An example of this would be 13 ground 3 fancy, 14 ground 2 fancy; also a smaller effect would be 9 ground 1 fancy, 8 ground 2 fancy. Many other variations in this direction will readily suggest themselves to the open mind, only let it be emphasized that the form of design is often too monotonous and rich rewards await the man who has the courage to present something which is novel as well as attractive and practicable.

THE PATTERN WHEEL.

The designs are much extended in scope by introducing the pattern wheel on to the attachment for producing vertical stripes, so that the form of the pattern is not straight, but can be varied in angle and direction. This is brought about by the use of curved discs known as pattern wheels which are introduced to operate the guide bar to give it a varied side to side motion. By this means a very effective agent for patterning is introduced and one which is capable of a wide degree of variation, the patterns having a large use in underwear and especially for the freer varieties used on hose and half-hose fabrics.

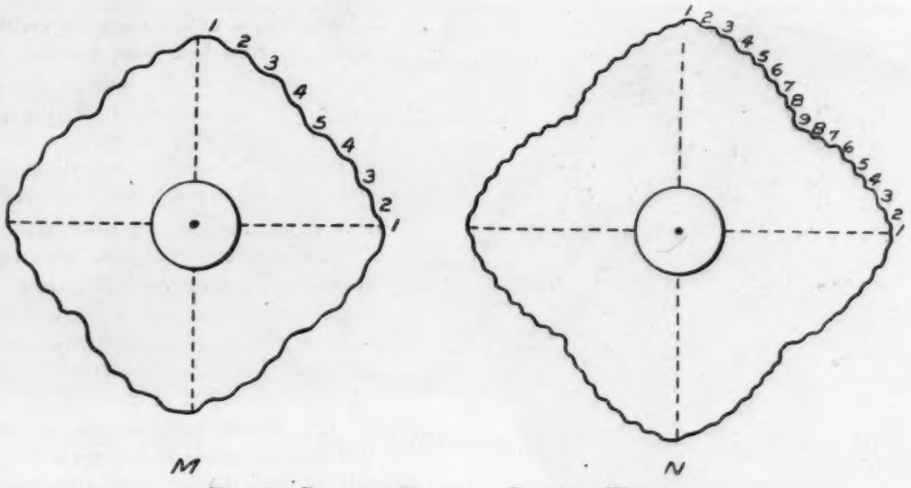


FIG. 6. PATTERN DISKS OR DAWSON WHEELS.

Diagrams M and N, Fig. 6, illustrate the principle of drawing out these pattern disks, sometimes known as Dawson wheels from the inventor who first applied them to hosiery machinery. The Dawson wheel has long been used for a variety of machines, notable amongst which is the warp loom, the lace machine, and in a modified form the fashioning attachment of the frame. The outline of wheel M gives the form of surface for a Dawson wheel which will give a zig-zag pattern when applied to the end of a guide bar in the vertical striping attachment. The divisions of the wheel are made in an exact manner so as to give each division an equal space, for on this depends largely the exact working of the attachment. The highest part of the wheel is shown at the point marked 1 and the gradual descent to the parts marked 2, 3, 4 and 5 respectively are shown where the wheel reaches its maximum depth of circumference, the form at once rising step by step until the former height at 1 is reached when the pattern repeats itself and the cutting is continued in the same way right around the circumference of the wheel.

The side of wheel is such as will give an exact number of repeats and should not be too small. The exact size of the steps depend on the gage of the frame and must be accurately determined so as to move the points exactly the distance of a needle space, otherwise the lapping of the yarns will not be possible to accomplish. Again it is advisable to have the space from one step to the next nicely graduated so as to give a smooth and gliding motion with no sign of irregularity or jerkiness. Example M is the wheel for what may be termed a 5-lap, because the guide bar with its points are moved to the right for five needle spaces, when the movement is reversed and the points move a similar distance to the left after which the pattern is repeated. At each stage the guide points with their warp threads are arranged in the required manner and after the ordinary course has been worked, lap their threads over the needles directly in front and give the cloth a Vandyke or zig-zag pattern winding in the direction of the length. Fig. 7 gives a view of the fabric typical of this kind of pattern which is greatly in demand for fancy cloths. The warp points are arranged 15 empty and 3 threaded exactly as in Fig. 4, the first and third guides having the same color and white forming the middle thread of the three.

The guide bars so arranged are given an 8 lap, that is they are moved one needle space to the right for 7 and then the movement being reversed, they move to the left one needle space at once back to the starting position. Fig. 8 gives another variety where the pattern consists of about 2½ inches of plain fabric and 5 guide points filled

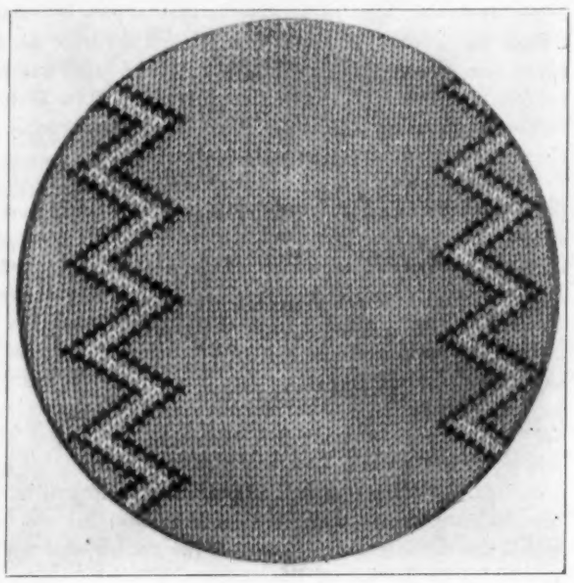


FIG. 7.

alternately with white and black yarns of mercerized cotton, there being three white threads and two black ones. This arrangement is given a 9 lap by means of the Dawson wheel, the circumference of which is given at Diagram N where it will be noted that the steps can be numbered from 1 to 9 and going from the outside inwards and reverse

round the circumference of the wheel. The result is very effective in affording a suitable embellishment for the cloth and making it suitable for a wider range of cloths. From the nature of the structure of the Dawson wheel it will be seen that it is obliged to have the form described and such patterns are more or less of a zig-zag character.

The surface of the wheels shown at M and N must not be taken as exact drawings of the wheels actually used for the work. As a matter of fact the sketches are rather

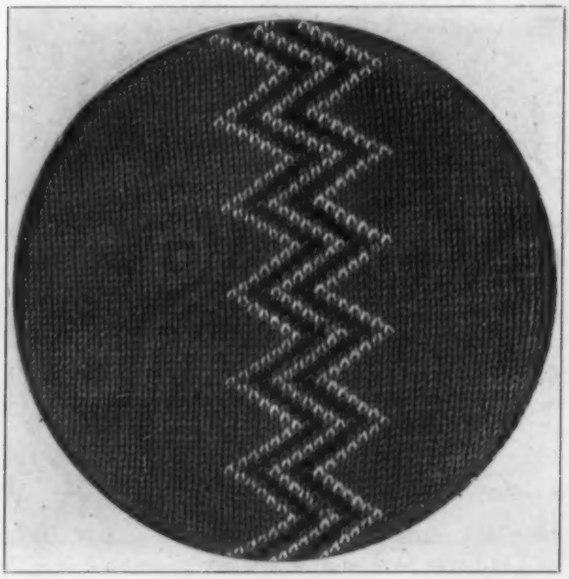


Fig. 8.

exaggerated in order to show more clearly the way in which they are cut. As the guide bar by one step on the wheel is to move to the right the distance of one needle only, then it will be understood that the difference in height from one step to another is very slight, but nevertheless the whole success of the pattern depends on this space being accurately gaged and set to the guide bar with perfect precision. The usual size of wheel is from 12 to 15 inches in diameter and the pattern is repeated round the circumference an exact number of repeats.

A useful variation of the two kinds of designs just described, consisting of a combination of the plain vertical stripe effect alternating with a portion of twill may be used with effect. The guide points may be arranged to have 15 empty and 3 full as before and for the twill the bar may be given a 9 shog to the right, when the bar is brought back over the center of the twill portion and say 11 courses of plain stripe worked. Sufficient examples have been given to show the direction in which the resourceful operator can contrive new and striking designs which will give to the cloth just that touch of novelty which is sufficient to sell the product in encouraging quantities and the designer knows that he is contributing his share towards the advancement of taste in the matter of dress and has added to the joy of life.

Figure 9 gives a full view of the frame under consideration when it will be been to correspond in general to the Cottons' patent already described. The stand with the bobbins of fancy yarn are plainly visible above the frame and the guide bar with its points directly in front of the needles of the machine. When the embroidery is not required the guide bars can be easily lifted out and ordinary plain fabrics produced.

The Knit Goods Market.

A demand which mills are unable to meet is the dominant feature of the hosiery market. While in some instances buyers are offering a premium for advance delivery, there is a hesitancy on the part of some manufacturers to take advantage of the scarcity. Prices on some lines are obviously not as high as the situation would seem to justify.

A Philadelphia mill making 84 needle two pound cotton mixed seamless half hose, bundled, went out with its line quite recently at 60 cents a dozen. This manager learned of two up-state mills offering precisely the same character of socks at 57½ cents, a price with which he cannot compete, because his operating expenses are higher than in the small towns where the rival mills are located.

It is a question among some manufacturers whether mills should give to jobbers the advantage which they enjoy in the way of lower operating costs. By doing so they invite the city manufacturer to the country and bring about competition which they otherwise would escape.

An unusual demand for ladies' 220 needle mercerized hosiery has developed, a number of mills being caught short. For several weeks agents have been combing mills for this class of goods in the gray. It appears to be less difficult to have dyeing done, particularly in black, than to find mercerized stock in the gray.

Knitters are having unsatisfactory deliveries of mercerized and cotton yarns in the finer numbers, due in part to congested freight conditions. Considerable yarn is going from Philadelphia to New England knitting mills by express as a means for circumventing the congestion.

An important mill in Reading, Pa., shipping extensively to New York, resorted to auto truck delivery. The distance is 260 miles for the round trip, and the cost of this sort of transportation is 20 cents a mile. The mill therefore pays $52 for the delivery of a two-ton shipment, as against $12 by rail. Scarcity of merchandize and congestion on the railroads forces this additional cost of delivery.

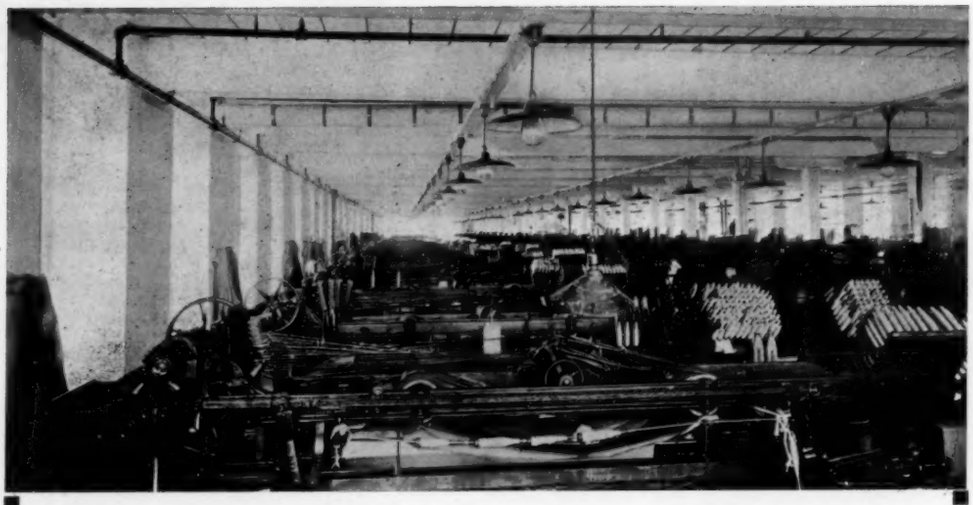
The demand for new equipment is no less pronounced than that for hosiery. Machine builders report a phenomenal drain upon their facilities. Probably as much new machinery is going into new hosiery mills as in the expansion of factories well established.

Within the last few months six additional hosiery mills have been put in operation in Reading, Pa., their equipment ranging from 10 to 54 knitting machines. Two are making the much wanted ladies' 220 needle mercerized, and are delivering in the gray, on business that will keep them employed through the Summer.

The fear is frequently expressed that unless the present brisk market continues several years, an unusual number of failures among smaller establishments may be recorded, as it is apparent the equipment already is far in excess of normal demands.

On the other hand, it is pointed out, when the slump comes it will be only the mills with absolutely modern equipment that can survive, particularly if it again becomes necessary to compete with foreign manufacturers.

As an outcome of the European war, the manufacture of infants' fancy top socks has become a very profitable branch of the hosiery trade. A Philadelphia manu-



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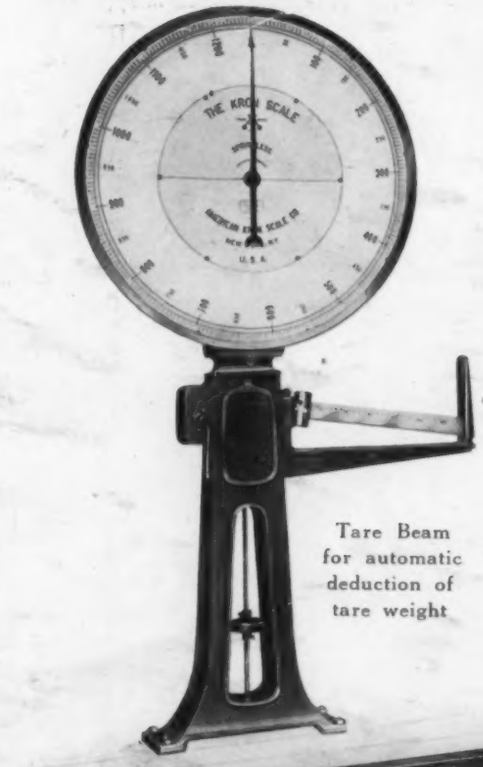

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facturer operating several mills and who long since has specialized in infants' socks, is reaping a harvest. This manufacturer never slackened operations during the dull period following the outbreak of the war, and accumulated heavy stocks made from low priced yarn. Now, he is shipping on virtually his own terms. "I have the goods; nobody wanted them while they could get German socks," he says. "Now they want them; I know they do, and to get them they must pay me a profit on high priced yarn."

The spectacular demand for infants' socks is responsible for the starting of a mill in Philadelphia which is producing a very close imitation of the popular German socks. The manager, who had considerable mill training in Chemnitz, Germany, is turning out in large volume a sock with seamless foot and fashioned top, with six-color stripes. Before his mill got in operation several weeks ago, he virtually had sold up until late summer, from samples.

There was recently introduced in the Philadelphia market a line of infants' full stockings in mercerized, silk and wool, the production of a Providence, R. I. mill. Jobbers handling the line already are calling for June deliveries.

A strike in a number of commercial dye houses in Philadelphia is seriously interfering with the business of not a few mills which do not maintain dye houses. The strike worked a hardship upon sweater manufacturers in particular.

Because of the seriousness of the situation growing out of the strike and the scarcity of dyes, Philadelphia sweater manufacturers recently had a meeting at which steps were taken for organizing a movement for relief. Just how it is to be obtained is what the manufacturers are trying to find out.

While the dye shortage continues to menace many manufacturers, it is apparent that black is coming through more freely than a month or six weeks ago. The sources, however, seem to be known to comparatively few consumers.

Two commercial dyers in Reading, Pa., are producing black—oxidized and sulphur—but are using every ounce they make. Another concern is turning out sulphur black, going largely to the carpet trade, however.

Much of the black on the market is very inferior, and buyers are offering a premium for hosiery showing the best black. A case in point is cited by a Philadelphia mill making misses ribbed hosiery. A New York jobber who is having deliveries against a contract placed several months ago, got into competition with the production of a southern hosiery mill. By contrast, the Philadelphia hosiery was gray. "Give me a black as good as that of the southern mill," the jobber pleaded, "and I will willingly pay several cents a dozen more than the contract price."

A southern mill's misses ribbed, showing good black, have advanced to 72½ cents a dozen, from 62½, and are reported moving in good volume at the higher price.

Underwear manufacturers, it developed at a meeting in Reading, Pa., March 11, are having no less trouble than hosiery makers. Their complaint is of delayed deliveries of yarns, the attitude of spinners and the high price of bleach. Chloride of lime, which mills fortunate enough to cover are drawing against contract at $1.75 per 100 pounds, was quoted at the meeting at 9¾ to 13 cents.

Salt, used in making chlorine gas, jumped 10 per cent recently. A Philadelphia mill doing commercial mercerizing, has advanced its charges 33 per cent. About the only factors not taking full advantage of the unusual situation are the knit goods manufacturers.

One very clever mill manager in moving his prices up exhibits to his customers a schedule showing the increased costs of production. He adds the increase to his prices and reports no serious objection from houses which he is supplying. The mill in question is establishing a very desirable trade, mainly through the manager's frankness in disclosing operating costs.

Knit goods manufacturers, through a movement inaugurated in Philadelphia, are interested in having the retail merchants discontinue the fixed price policy. Considerable headway is being made in this direction. The hope is felt that prices of knit goods will fluctuate in retail stores as in piece goods and other merchandise.

One very clever retailer solved the problem in this way: A line of ladies' mercerized hosiery going to the jobber at $1.90 a dozen was sold in this retail store at 25 cents a pair. Now the jobber is paying $2.25 and the retailer is selling three pairs in a box for one dollar, the sum originally received for four pairs.

In getting away from the fixed price, it is believed some retailers will overdo the matter and provide for an abnormal profit, which, in the course of time will be readjusted by their irresistible leveler, competition.

Program of the Annual Convention of the National Association of Hosiery and Underwear Manufacturers.

TUESDAY, MAY 16TH.

Meeting called to order promptly at 10:30 A. M., in the Veteran Corps Room of the First Regiment Armory, Broad and Callowhill Streets.

Invocation.

Welcome address. Hon. Thomas B. Smith, Mayor of Philadelphia.

Address, Edward James Cattell, Statistician, Philadelphia.

Impromptu discussion.

Communications.

Miscellaneous business.

Appointment of nominating committee.

WEDNESDAY, MAY 17TH.

Meeting will be called to order promptly at 10:00 A. M. in Convention Hall of the First Regiment Armory.

Address, "The Distributor." By a member of the National Wholesale Dry Goods Association.

Address, "The Manufacturer." By a member of the National Association of Hosiery and Underwear Manufacturers.

Address—By Stanley L. Krebs, of Philadelphia.

Address, "Dye Stuffs." Herman A. Metz, Farbwerke-Hoechst Co., New York City.

Reports from special committees.

Miscellaneous business.

Open discussion.

Federal Regulation for the Hours of Labor for Children and Women Workers. Discussion opened by P. C. Withers, of Illinois Knitting Co., Mt. Vernon, Ill.

Election of officers.
Resolutions.
Question box and discussion of questions presented.

THURSDAY, MAY 18TH.

Session to be held in Main Auditorium of the Manufacturers' Club, Broad and Walnut Streets. Admittance to hall will be strictly confined to those holding registration cards, which will be given out from Registration Booth, in Exhibition Hall, or supplied by the Secretary. Meeting will be called to order promptly at 10:00 A. M.

Reading of minutes of 1915 convention.
Annual reports of the Secretary.
Report of the Treasurer.
Reports of standing and special committees.
Reports of sub-associations.
Report of board of directors.
Industrial preparedness day.

EVENING SESSION.

The entertainment features for the Twelfth Annual Reunion of "The Happy Family" promises to be unusually attractive, as the officers, board of directors and advisory board have perfected arrangements on a broader and more comprehensive scale than ever before.

A banquet, with seating arrangements accommodating eight or ten at a table, will be given at the Scottish Rite Hall, Broad and Race Sts., beginning promptly at 6:30 o'clock. A nominal charge of $1.00 per plate to be made to everybody who is privileged to attend.

The vaudeville-smoker will be given in the main auditorium of the Parkway Building, Broad and Cherry Sts., beginning promptly at 8:30. No expense will be spared in making this event one of special prominence, in keeping with the Association's standing and achievements. This entertainment is tendered complimentary to active and associate members in good standing, two tickets being issued to each concern. All applications for admission tickets must be made to the Secretary not later than Thursday noon, the 18th of May.

Both the banquet and the vaudeville-smoker will be informal.

Accuracy and Efficiency.

BY W. A. C.

In the manufacture of hosiery, the most important factor is accuracy in the knitting department. If seconds are made in the knitting department, they cannot be finished as firsts in the finishing department. Knitting machines should be run, first of all, at the proper speed, dependent upon the gauge. The proper speed for eighteen gauge needles is 260 revolutions per minute; forty-two guage, 250 revolutions per minute; forty-eight gauge, 240 revolutions per minute.

Some manufacturers, being over-anxious to get a large production, run their machines over the capacity. This over-speed of the machine is the cause of excess waste and seconds. Knitting machines, like all other machinery, when run over their capacity, are soon put out of commission, and the life of the machine is reduced to the minimum. When a knitting machine is run at a high speed, needle breakage is necessarily high. When needle breakage is high, the per cent of waste and seconds is also high.

Next to the proper speed, the manner in which a machine is kept up, is most important. There should be at least one thoroughly competent man to have the supervision of the repair work of the most vital parts of the machine. The emery wheel, for grinding and fitting the cams of the machine, is very essential. Notwithstanding the fact, the average fixer does more harm than good with the emery wheel. All circular machines have curved cams. This curve should never be changed. The inexperienced machine fixer, in grinding these cams, changes the curves. The result is that the machine begins to break the shanks of the needles. So, we see that the emery wheel, in the hands of an incompetent fixer, is detrimental to any knitting room.

Following the repair work in importance, is the proper care, oiling, and cleaning of the needle cylinders. The best lubricant for the needles and sinkers is lard oil economically used. A little mutton tallow, used twice a week in connection with light spindle oil, makes an excellent combination for all the sliding parts of the machine. Frequent oiling, in small quantities, is more effective than heavy oiling, seldom used. All the excess oil about the machine gets on the knitted fabric, and shows on the goods after it is dyed.

The needle cylinders should be cleaned about every three weeks, according to the kind of yarn being run. Coarse soft yarn requires more cleaning of the cylinders than combed or mercerized yarn. When the cylinders become clogged with lint, the sinkers do not come up on the fabric, thereby failing to do their part of the work. When this is the case, we find the needles cutting holes in the fabric and dropping stitches.

Too much care cannot be taken by the operator of the machines, especially in running fine gauge machines. Many machines have been spoiled by the operator, by rough handling. Long before the machine should need repairs, it is rendered almost worthless.

Therefore, accuracy and efficiency demand that the machine be run at the proper speed, that it be properly repaired, properly cleaned and oiled, and properly handled by the operator.

Looper Troubles—Some Causes.

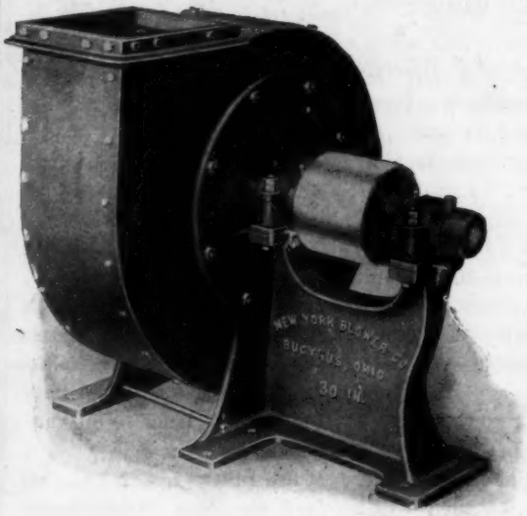
BY "BOB."

I noticed in a recent issue of Cotton, that one of the readers was asking some one to tell him the cause of the Record looper skipping and dropping stitches. For various reasons, and from different causes, any looper machine will give trouble of this nature, as well as the Record.

First of all keep the proper gauge work for the looper. Don't try to put too fine or too coarse work for the points on any looper. An extra fine stocking, for instance a 240 needle 3 1-2 inch diameter, will not sew perfect continuously, on a 22 point looper. The same thing is true, with a coarser gauge, don't try to crowd a coarse hose onto a fine machine. We can go one step over or under, but I would not advise extremes either way. A 20 point machine can handle 18 point or 22 point work, and do it perfectly and so on down for various gauges according to the points.

One feature about the Record looper, if the work is not put on even, so that it cuts or ravels down even and

Here's the Fan—AND—Here's the Wheel



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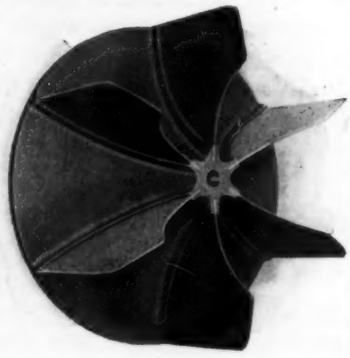

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smooth, we can look for dropped stitches, and skipping. The stocking must be put on even to get perfect results. What does a stocking look like that has a rough seam across the toe, caused by irregular looping? See that the needle goes through the stitches clear and even, not too much to either side of the stitch but right through the center. Have the knives good and keen, and set at the correct height so as to cut clean. Have the brush set to take all the lint, etc., off, and leave the stitches clean and even.

Do not set the brush too low, if this is done it has a tendency to squeeze the work and sometimes breaks the stitch, or else it pushes the stitches off the points.

See that the dial does not move while the needle is in the point. It may do this without attracting notice if not careful. By putting a chalk mark on the movable part of the dial, and stationary part, and turning the crank, one can tell whether or not the dial moves at the wrong time.

If the operator spaces her work too far, it will cause the machine to unchain.

If the chaining needle is bent, it will cause the same trouble.

Two inches is a whole lot of space to leave between stockings. It will be observed by leaving a great space between each hose, that when the stocking makes the turn what a great strain there is on the point of the chaining needle. The makers of this particular machine have what is termed a bent chaining needle, and will furnish these for the same figure as the straight ones. I use the bent chaining needle all the time and have found that it helps to retain the chain, and avoids this skipping.

Do not put too much strain on the yarn by tension, only just enough to form an elastic seam, and to sew perfectly. A little lean in the sewing needle towards the hook, will help throw the loop into the hook, but not too much, or the point of the hook will catch the slot in the needle and do a lot of harm.

See that there is no lost motion in any part of the machine.

If these few hints are not what the reader requires, and if he wishes any further assistance, I would be glad, if he would write the Editor and explain his troubles more fully. Then I could go into the matter more thoroughly and perhaps assist him. I hope the hints will help some one to solve his looper troubles.

Link-Belt machinery for the handling, preparation and storing of stone, gravel, sand etc., is the title of a new booklet issued by the Link-Belt Company of Chicago. This 80 page illustrated booklet contains many new and unique features along the lines indicated by its title. A copy will be forwarded to any interested person who indicates his position and asks for book No. C 213.

Bulletin No. 46023, recently issued by the General Electric Company, describes briefly that Company's Arc Circuit Volt Meter, which is a special instrument designed for testing direct current series arc circuits. The approximate dimensions and the connections together with prices are included.

Among the Knitting Mills.

Southern knitting mills are running well up to one hundred per cent capacity. A great many mills are unable to accept all the orders which are offered to them, even though they are at very attractive prices. The close of March found underwear manufacturers behind on deliveries in both the high and medium grades.

It is rumored that the Interwoven Stocking Co., Martinsburg, W. Va., will shortly add considerably to its capacity, the location of the new branch to be at Charlottesville, Va.

The Freeze-Bacon Hosiery Mills, at Hendersonville, N. C., contemplates adding 15 new knitting machines, with daily capacity of 100 dozen pairs.

New machinery is being added to the plant of the Nick-a-Jack Hosiery Mills, Chattanooga, Tenn., which will increase their equipment of 10 knitting machines to 45 knitting machines, 8 ribbers and 9 loopers.

The Whitehead Hosiery Mills, Burlington, N. C., recently started their dyeing and bleaching departments. Their present capacity is 1300 dozen men's half hose daily.

The new plant of the Bowling-Emory Knitting Co. will soon be in operation with 162 machines, and a capacity of more than 1,000 dozen pairs of socks a day.

W. Y. Frazier and D. B. Mull, of Connelly Springs, N. C., will build a knitting mill at Icard, N. C.

The Orion Knitting Mill, Beaufort, N. C., will shortly install additional machinery.

At Cerro Gordo, N. C., a hosiery mill will be organized by J. H. Williamson, President of the Cerro Gordo Warehouse Co., D. G. Nance, and associates. An equipment of 30 hosiery knitters, with accompanying machinery, will be installed. Contracts for machinery have not yet been made.

An underwear knitting mill will be established at Waynesboro, Virginia. L. Mehler and associates are the promoters. They will install 10 knitting machines as an initial equipment.

The O. K. Knitting Mills, Inc., New Orleans, La., are now located in quarters at 301 to 307 Decatur and 501 to 507 Bienville Streets occupying a floor space of 17,750 square feet, where they are installing in addition to their 25 machines the following new machinery: 3 Sections 5 and 7G Grosser automatic power knitting machines; I F F United States Hoffman pressing machine; and 1 Mc Cleary brushing machine. These will give a weekly capacity of about 350 dozen sweater coats. A. Radlauer is General Manager.

Capitalized at $100,000, the Norfolk (Va.) Hosiery & Underwear Mills Co. has been incorporated. The officers are as follows: Joseph B. Hecht, president; C. J. Dey, vice-president; Morton Hecht, secretary-treasurer.

Clement M. Egner, Elkton, Md., and associates have incorporated the Eagle Knitting Mills, with $5,000 capital.

The Suffolk Knitting Mills at Suffolk, Va., report business good. These mills have made a number of improvements recently.

The Norfolk, (Va.) Knitting Mills report business good; plenty of orders and running full time.

The Bell Hosiery Mills at Suffolk, Va., have just added 50 new knitting machines as well as 25 new Brinton ribbers. This mill expects to add ten more ribbers and 20

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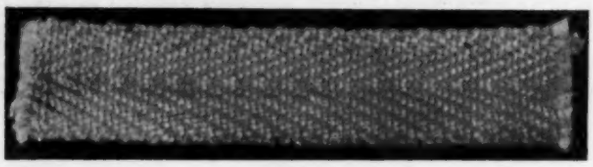

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footers at an early date. When asked his opinion concerning the dye situation, James L. Bell, the treasurer, said, "Dye is short of course, and some of it is unreasonable in price, but the hosiery manufacturers as a general rule are managing to run and to supply the demands. I think that they must be supplying it pretty satisfactorily, because when yarn could be bought for 18 cents and dye at 16 to 20 cents, hosiery sold for just as much as it does now with yarn at 21 cents and dye all the way from 80 cents to $18.00 a pound." He continued further that he believed the dye problem would be worked out in this country whether the war stops or continues for a long time, as he believed the dye manufacturers would be afforded ample tariff protection to enable them to develop a real dye industry in this country. In his opinion this industry will be sufficiently complete to compete with Germany or any other country. Furthermore, he stated it as his opinion that Germany will hardly be able to compete with the United States in the knit goods line, as while some of their products are cheaper, dye stuffs for example, our raw cotton is also cheaper, and against their lower priced labor we have more productive labor in this country. He stated that while the knit goods business at present is good he expects it to get better all the time.

The Penfield Hosiery Mills, at Greensboro, Ga., burned recently with a loss of oter twenty thousand dollars and very little insurance. The mills had over a thousand dollars' worth of manufactured goods ready for delivery. The president, E. R. Boswell, was the heaviest loser. The origin of the fire is not known.

George F. Sansbury, Frostburg, Md., is architect for the Parker Hosiery Mills' proposed addition at Frostburg. This company will build a three-story 56 x 23-foot addition, with concrete storage basement floors, fire-escapes, elevators, lighting and ventilating system. It will install 60 knitters, 25 loopers and 63 ribbers to present equipment of 50 knitters, 60 ribbers and 15 loopers.

The Merck-Hetrick Manufacturing Co., Gainesville, Ga., will add mill machinery, including 50 knitters costing $17,000 and steam-electrical equipment costing $1,000.

A hosiery mill will be established at New Orleans by W. B. Davis, who is asking for prices on the necessary machinery.

Francis B. Levan, of Lenhartsville, Pa., may convert his creamery building into a knitting mill, capital from Hamburg borough becoming interested in the prospects for a fair labor supply at this place.

H. W. Anthony and Dr. O. B. Herbein, operating the Strausstown (Pa.) Hosiery Mill, are running to capacity at present. The mill, started in 1910, has been electrified throughout, and recently a one-story annex was built. A new 30 by 40 factory annex, two stories, and an additional boiler house, 30 by 30 feet, are planned.

The Des Moines Hosiery Mills, of Des Moines, Iowa, where the main mill is located, and which also operates a mill at Boone, Iowa, are building a new mill at Boone. Their present mill at Boone, has been found too small to cope with the increased business, and a much larger mill is under construction.

The Boone plant will be planned for a strictly up-to-date mill, fireproof and sanitary, and nothing left undone, to make it the finest in the West. B. Brown, who is superintendent at Boone, has a wide experience in the hosiery business. This firm manufactures mens, ladies and childrens hose, of the finest grades, bearing the trade name of "Armor Plate," known as the standard make throughout the West. Extensive improvements are under way to add to the main mill at Des Moines, and as soon as weather conditions permit, remodeling will begin.

The Brown Knitting Co., at Warsaw, N. Y., manufacturers of underwear, etc., is erecting a four-story addition to its plant, and will double its capacity in the spring, adding the manufacture of ribbed goods to its output. The new building will be 60 by 117 feet, and built of brick and concrete. The company has been confining its output to balbriggan underwear since starting nine years ago. Its present capacity is 750 dozens a day.

Contract awarded for a six-story 200 x 80 feet addition to P. H. Hanes Knitting Company's No. 2 mill at Winston-Salem, N. C. Building to cost $90,000. Enlargement will be equipped with machinery enabling the knitting mill to consume entire output of Nos. 3 and 4 mills.

The Peerless Knitting Mills, Boston, Mass., are extending selling organization and their manufacturing facilities. Work is nearing completion on a brick addition to the factory, which will cost $25,000. They will install a new finishing plant, also, the second building to cost $50,000.

The Carolina Hosiery Mills Co., Marion, N. C., plans building additions and adding new machinery.

Perry Knitting Company has leased a building in Castile, N. Y., which will be started about April 1 as a branch plant. Children's flat ribbed and fleeced underwear and union suits are to be manufactured. The main plant is located at Perry.

Thomas F. Byrne, of Phoenixville, Pa., manufacturer of women's and children's ribbed underwear, sweater coats and shoe laces, plans erection of a three-story, 206 x 60 foot addition to his plant. Present equipment comprises 400 knitters and 400 braiders.

William F. Taubel, Inc., of Millville, Pa., has purchased a site on which a hosiery finishing mill to cost $150,000 will be erected.

Making Dyestuffs in America.

So much interest has been aroused over the question of dyestuffs and their shortage, that news of materials of this character being manufactured in the United States is an ever welcome item to textile readers. A report recently received from Standard Aniline Products, Inc., 366 5th Ave., New York, advises that their newly established industry for manufacturing dye stuffs in this country is progressing finely. They are marketing the following products regularly, although at the present time, these products are sold to two years ahead: Sulphur Black, Beta Napthol, Paranitraniline, Mono Sulphonic Acid, and Fur Dyes. Clients using these materials are said to be greatly pleased with the results obtained. This company also reports that they now have in preparation other colors for cotton piece goods and yarn, such as Sulphur Blue, Sulphur Brown, Sulphur Yellow, and Sulphur Green, and in perhaps four weeks' time they expect to be able to put some of these on the market, to be followed up with others as quickly as additional machinery can be installed in their works.